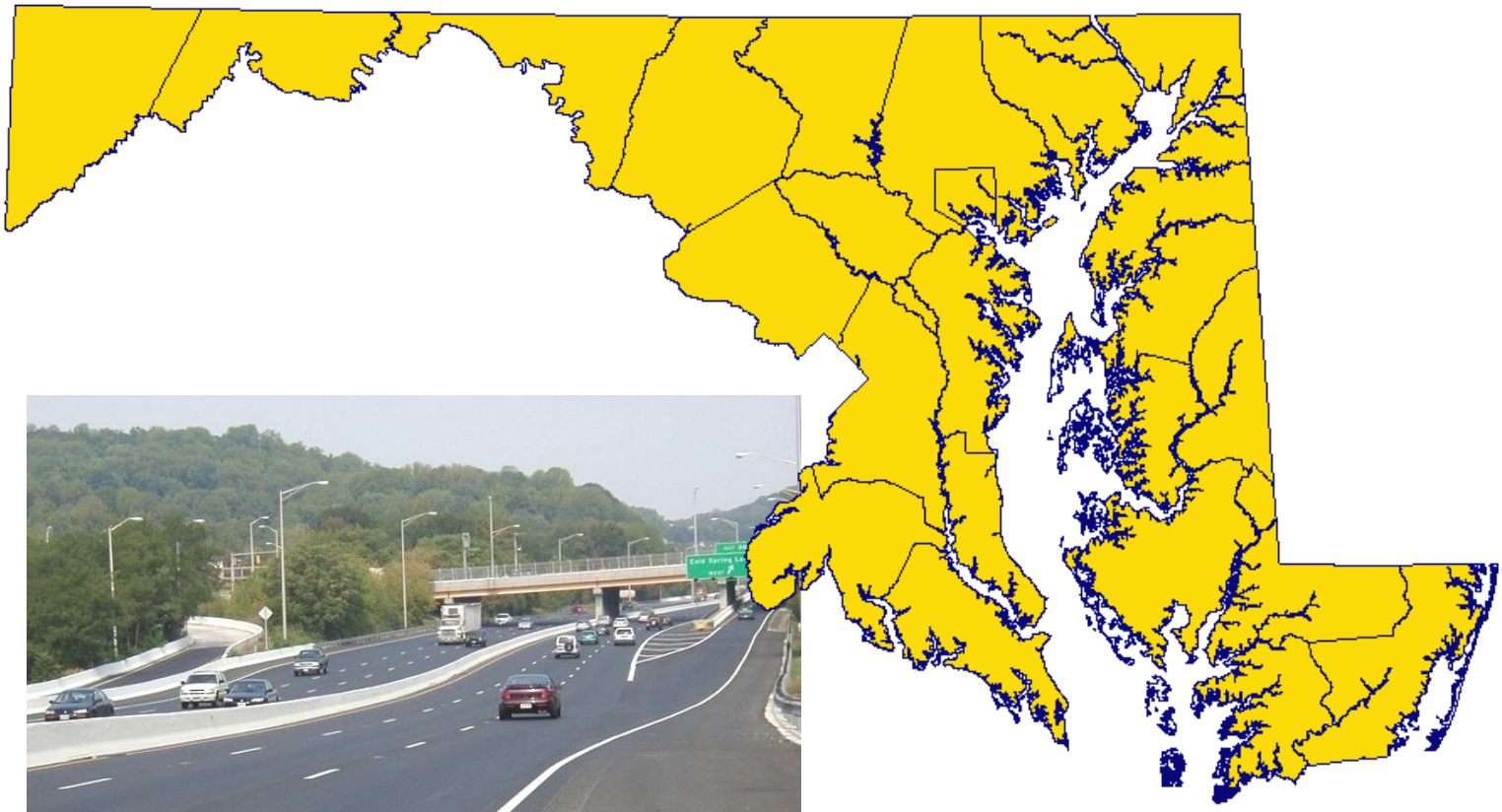
# MDSHA Guide to Pavement Preservation

## Maryland State Highway Administration





**Prepared by the Pavement and Geotechnical Division of the Office of Materials Technology**

**March 2011**

SHA State Highway Administration *Driven to Excel*
Maryland Department of Transportation

SHA MT

# MDSHA Guide to Pavement Preservation

This agreement between the Maryland State Highway Administration (MDSHA) and the DelMar Division of the Federal Highway Administration (FHWA) is intended to implement the use of Federal-aid Highway Funding for Pavement Preservation activities on pavements selected under Fund 77 – System Preservation.

The criteria used to develop this agreement are based on the FHWA guidance issued by FHWA on September 12, 2005 (Pavement Preservation Definitions) and the Pavement Preservation Technical Appraisal issued for Maryland in May 2007 issued by the National Center for Pavement Preservation (NCPP) and FHWA.

This agreement is limited to Fund 77 activities on Roadways that are Federal-Aid eligible. It does not cover activities on Structures. Specific Fund 77 activities are listed herein in Table F: Pavement Fixes. All activities listed under the Categories of "Structural Rehabilitation" and "Pavement Preservation" shall be eligible for federal funding.

By signing this agreement, MDSHA and the FHWA incorporate by reference the laws, regulations, policies, standards and procedures which govern or are applicable to Federal-Aid projects.

Nothing in this agreement shall be construed to relieve MDSHA from ultimate accountability for compliance with Federal Laws and regulations with respect to the expenditure of Federal-Aid highway funds for System Preservation activities in the State of Maryland, including those funds used for local government projects.

This agreement shall become effective on projects selected for the Maryland Fiscal Year 2012 program or later. This agreement may be cancelled or modified at any time by either MDSHA or the FHWA given 90 days notices.

Maryland State Highway Administration

3-2-11

Gregory Welker, Deputy Administrator/ Chief Engineer for Operations — Date

Federal Highway Administration

5-5-2011

Hassan Raza, Division Administrator DelMar Division — Date

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# Preface

Historically, the Maryland State Highway Administration (MDSHA) has relied almost exclusively upon rehabilitation strategies to maintain their pavement system. While rehabilitation is a valid strategy, it is not necessarily the most cost-effective strategy; quite often, the more cost-effective treatments to maintain the pavement system are pavement preservation and preventive maintenance treatments. However, there was virtually no documentation available within MDSHA on these. Now, pavement preservation is an important facet of maintaining MDSHA's roadways.

The purpose of this document is to provide general guidance on the selection of pavement preservation and maintenance treatments. This guide is intended to be used by MDSHA pavement and geotechnical engineers and by District personnel (Project Development Teams, Maintenance and Construction Sections).

This guide will assist in determining "the right fix for the right road at the right time" when used in conjunction with network-level and project specific data. Step-by-step instructions on determining treatment options are provided through the use of flow charts, decision trees and treatment tables. At the end of the step-by-step process there will be many treatment options available. One or a combination of treatment options may be selected, depending on project-specific conditions. It is not the intent of this guide to provide a final treatment option(s). This guide will provide a series of options for preliminary consideration by District Offices and the Office of Materials Technology (OMT). It is anticipated that further project specific review, analysis and design will be required. Therefore, the final treatment option(s) should be determined in coordination with the Pavement and Geotechnical Division (PAGD) of OMT.

The treatment options noted in this guide are comprised of alternate treatments, some of which are not commonly practiced at MDSHA. Many of these treatments unfamiliar to MDSHA are being utilized by other State DOTs and both county and local agencies throughout the country. It is our goal to incorporate the use of these treatments in MDSHA projects using this guide as a tool to locate candidate projects. Currently, MDSHA does not have specifications for many of these treatments, and is in the process of updating/developing specifications for these treatments, addressing material, construction and quality control/assurance requirements.

In addition to the step-by-step instructions noted above, various treatment options are defined, along with information regarding treatment cost, advantages and disadvantages.

Any questions or comments concerning this guide should be directed to the individual below.

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# Determining Pavement Type:

There are different types of pavement within the MDSHA roadway network. Pavement deterioration, and therefore, treatment options for those pavements are directly influenced by the composition of the pavement. The following table contains brief descriptions of those pavement types:

**Table A – Pavement Types**

| Type | Description |
|---|---|
| Flexible* | Hot Mix Asphalt (HMA) over Aggregate, stone sub-base or soil borrow material. |
| Composite* | HMA over concrete pavement (Jointed Reinforced Concrete Pavement, Continuously Reinforces Concrete Pavement, Jointed Plain Concrete [JRCP, CRCP, JPCP]) over aggregate, stone sub-base or soil borrow material. |
| Rigid | JRCP, CRCP, JPCP over aggregate, stone sub-base or soil borrow material. |

* This pavement type may have a surface treatment such as slurry seal, chip seal, microsurfacing.

# Flexible and Composite (HMA-Surfaced) Pavements:

Users will need access to the following network-level information for Asphalt-Surfaced Pavements. This information will be used to determine a pool of appropriate treatments for a given project:

**Table B – Initial Roadway Data for HMA-Surfaced Pavements**

| Information | Source |
|---|---|
| Pavement Type | PM Base system[1] |
| Average Daily Traffic (ADT) | Highway Location Reference (HLR)[2] |
| International Roughness Index (IRI) | PM Base system[1] |
| Cracking Index (CI) | PM Base system[1] |
| Friction | PM Base system[1] |
| Average Rutting (in.) | PM Base system[1] |

1. http://170.93.42.173/omt/pmbase/query.asp
2. www.marylandroads.com/KeepingCurrent/performTrafficStudies/dataAndStats/hwyLocationRef/oppe/hlr.asp

**Obtaining IRI, CI, Friction and Rutting (in.) Data:**

Use the following criteria to determine the severity level for rutting:

**Table C. Criteria for Rut Depth**

| Average Rutting | Severity |
|---|---|
| 1/4" to 1/2" | Low (L) |
| >1/2" to 1" | Medium (M) |
| >1" | High (H) |

Obtain the most recent year IRI, CI, Friction and Rutting data available from the PM Base system. Also, it is a good idea to review multiple years' worth of data to determine the trend of the roadway's performance and to ensure the most recent years data is reasonable.

After obtaining the Pavement Type, ADT, and IRI, use Figures 1 and 2 to find the appropriate Treatment Table for asphalt-surfaced pavements.

Once the appropriate Treatment Table is selected, a field visit will be necessary to visually identify the presence of cracking / distress. Distresses should be categorized into "Load-Related" and/or "Non Load-Related" as listed in Table D below:

**Table D. Cracking/Distress Categories**

| Load-Related (Structural) | Non Load-Related (Functional) |
|---|---|
| Alligator (Fatigue) Cracking | Bleeding |
| Depression | Block Cracking |
| Edge Cracking | Bumps and Sags |
| Longitudinal Cracking | Corrugation |
| Patching | Joint Reflective Cracking |
| Potholes | Lane/Shoulder Drop-off |
| | Polished Aggregate |
| | Slippage Cracking |
| | Transverse Cracking |
| | Weathering and Raveling |

Note: Refer to the Asphalt Distress Paver Manual of the U.S. Army Corps of Engineers for definitions of distresses.

Use CI, Friction, Rutting (in.), in conjunction with cracking/distress category to determine viable Treatment Options. Each Treatment Table contains the Treatment Group and the Treatment number shown in parentheses. The Treatment Groups, Treatment numbers and the Treatments are listed in Table E. Refer to Appendix A for a definition of each Treatment.

One or a combination of Treatment Options may be selected, depending on project-specific conditions. The final Treatment Option(s) should be determined in coordination with the Pavement and Geotechnical Division (PAGD).

Once the final Treatment Option(s) is established, it will be necessary to develop contracts or use existing contracts for project implementation. Since it is not practical or desirable to have a contract for each treatment, Table E offers suggested grouping of treatments into various compatible Areawide contracts. There are some treatments, due to their more extensive scope of work, such as Heavy (Major) Rehabilitation and Reconstruction that are not compatible with Areawide contracts and would likely require Single Advertised contracts.

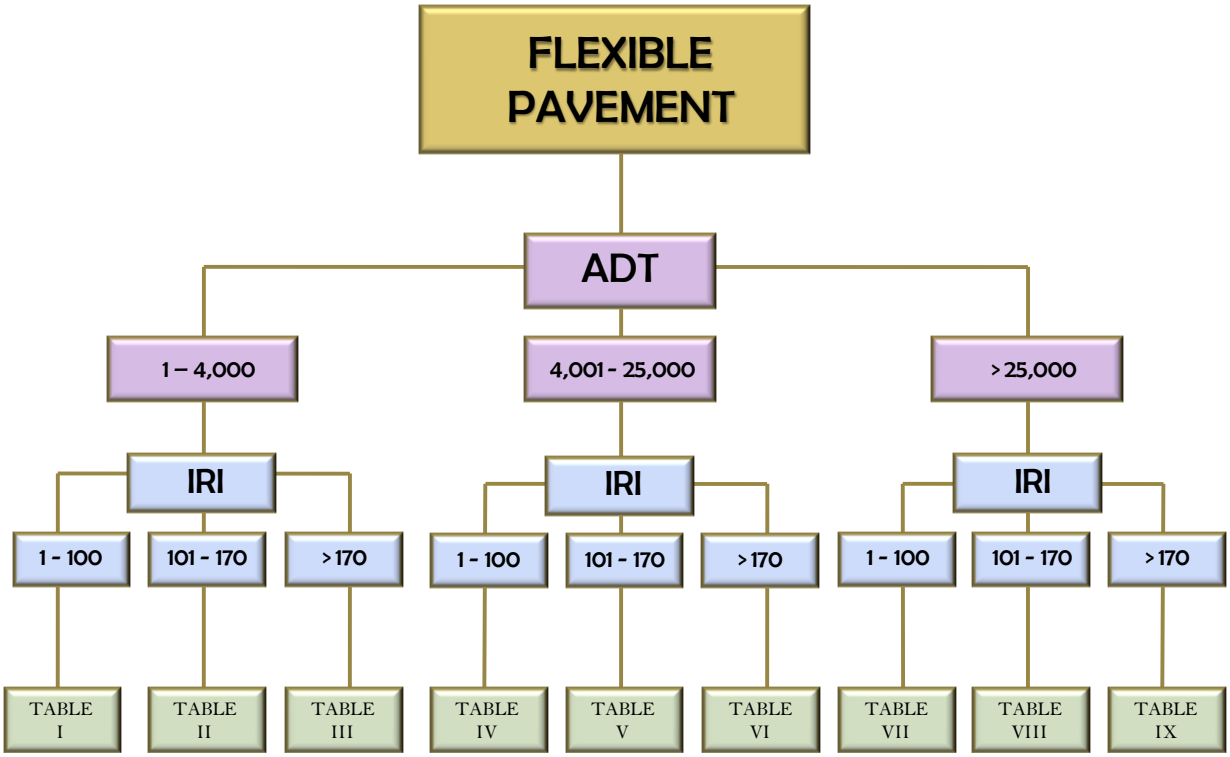


Figure 1 Decision Tree for Flexible Pavements

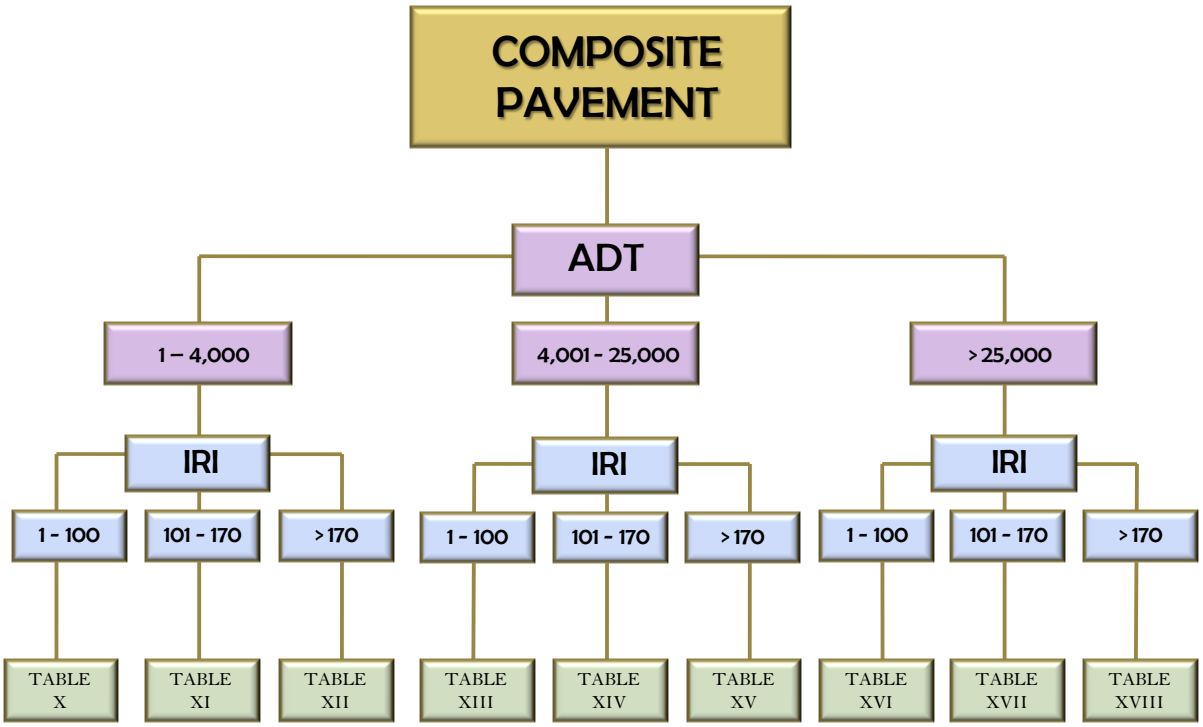


Figure 2 Decision Tree for Composite Pavements

## Rigid (Concrete-Surfaced) Pavements:

A field visit is required to determine the percent patching required within the project limits for rigid pavements. Use Figure 3 to identify the appropriate Treatment Options.

The Treatment Groups, Treatment numbers and the Treatments are listed in Table E. Refer to Appendix A for a definition of each Treatment.

One or a combination of Treatment Options may be selected, depending on project-specific conditions. The final Treatment Option(s) should be determined in coordination with the PAGD.

Once the final Treatment Option(s) is established, it will be necessary to develop contracts or use existing contracts for project implementation. Since it is not practical or desirable to have a contract for each treatment, Table E offers suggested grouping of treatments into various compatible Areawide contracts. There are some treatments, due to their more extensive scope of work, such as Reconstruction that is not compatible with Areawide contracts and would likely require Single Advertised contracts.

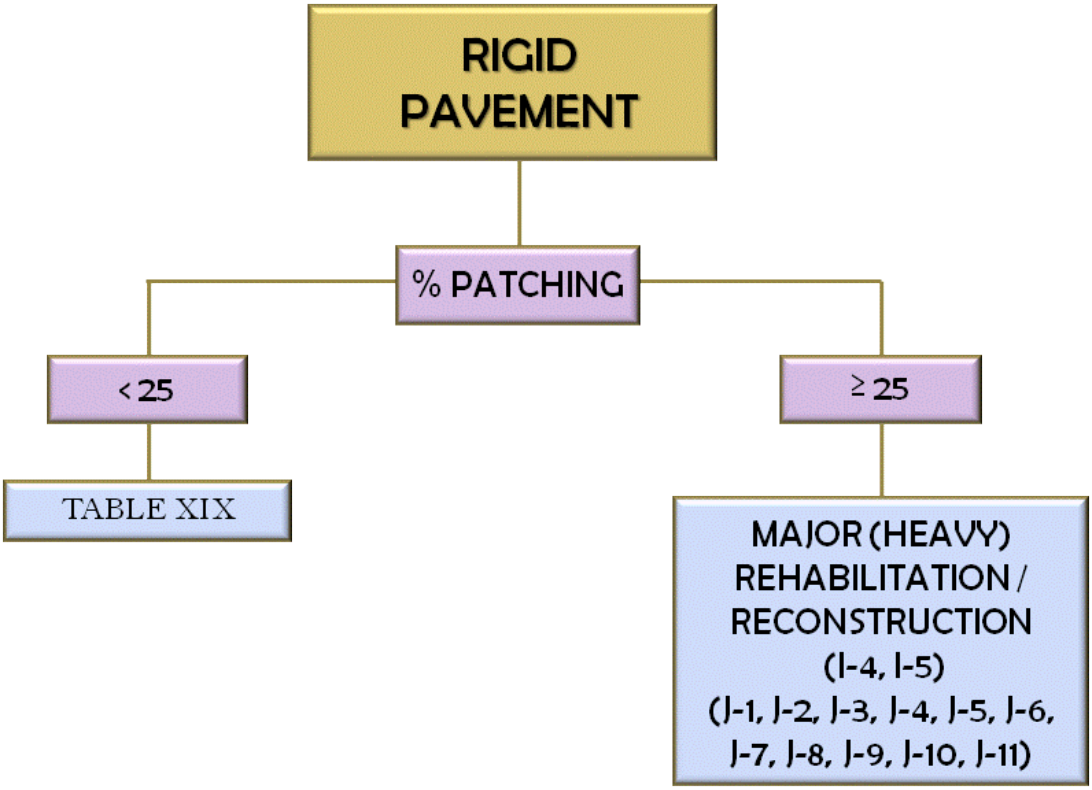


Figure 3 Decision Tree for Rigid Pavements

## Table E. List of Treatment Options

| Treatment Group | Treatment Number | Treatment | Compatible Areawide Contract |
|---|---|---|---|
| A. Crack/Joint Seals | A-1 | Crack Filling | Crack and Joint Seals |
| | A-2 | Crack Sealing | Crack and Joint Seals |
| | A-3 | Joint Sealing (and Resealing) | Crack and Joint Seals |
| | A-4 | Saw and Seal | Crack and Joint Seals |
| B. Asphalt Sealers / Rejuvenators | B-1 | Asphalt Sealers | Asphalt Emulsion Seals |
| | B-2 | Fog Seals / Rejuvenators | Asphalt Emulsion Seals |
| C. Aggregate Seals | C-1 | Cape Seal | Asphalt Emulsion Seals |
| | C-2 | Chip Seal (Modified) | Asphalt Emulsion Seals |
| | C-3 | High Friction Surface | High Friction Surface |
| | C-4 | Sand Seal | Asphalt Emulsion Seals |
| | C-5 | Sandwich Seal | Asphalt Emulsion Seals |
| | C-6 | Scrub Seal | Asphalt Emulsion Seals |
| | C-7 | Slurry Seal | Asphalt Emulsion Seals |
| | C-8 | Microsurfacing | Asphalt Emulsion Seals |
| D. Ultrathin HMA | D-1 | Ultrathin Bonded Wearing Course (Asphalt) | Ultrathin Bonded Wearing Course |
| E. Overlay | E-1 | HMA Overlay - Open Graded Friction Course | Grind, Patch and Resurface |
| | E-2 | HMA Overlay - Ultrathin (<1.5") | Grind, Patch and Resurface |
| | E-3 | HMA Overlay - Ultrathin (<1.5") (High Performance Thin Overlay) | Grind, Patch and Resurface |
| | E-4 | Grind and HMA Overlay - 64-22/28, w/ or w/o 8PV | Grind, Patch and Resurface |
| | E-5 | Hot In Place HMA Recycling (HIR) | Hot In-Place Recycling |
| | E-6 | Grind and HMA Overlay - GAP-SMA | Grind, Patch and Resurface |
| | E-7 | Grind and HMA Overlay - 76-22, Dense, 8PV | Grind, Patch and Resurface |
| | E-8 | HMA Overlay - 64-22/28, w/ or w/o 8PV | Grind, Patch and Resurface |
| | E-9 | HMA Overlay - GAP-SMA | Grind, Patch and Resurface |
| | E-10 | HMA Overlay - 76-22, Dense, 8PV | Grind, Patch and Resurface |
| | E-11 | Wedge/Level and HMA Overlay - 64-22/28, w/ or w/o 8PV | Grind, Patch and Resurface |
| | E-12 | Wedge/Level and HMA Overlay - GAP-SMA | Grind, Patch and Resurface |
| | E-13 | Wedge/Level and HMA Overlay - 76-22, Dense, 8PV | Grind, Patch and Resurface |
| | E-14 | PCC Overlay - Unbonded | Portland Cement Concrete Resurfacing |
| | E-15 | PCC Overlay - Bonded | Portland Cement Concrete Resurfacing |
| F. Patch | F-1 | HMA Partial-Depth Patch | Grind, Patch and Resurface |
| | F-2 | HMA Full-Depth Patch | Grind, Patch and Resurface |
| | F-3 | PCC Partial Depth Patch (Spall Repair) | Concrete Pavement Restoration |
| | F-4 | PCC Full Depth Patch | Concrete Pavement Restoration |
| G. Joint Treatments | G-1 | Cross-Stitching | Concrete Pavement Restoration |
| | G-2 | Dowel Bar Retrofit | Concrete Pavement Restoration |
| | G-3 | Undersealing/Slab Stabilization | Concrete Pavement Restoration |
| H. Grinding / Grooving | H-1 | Diamond Grinding | Concrete Pavement Restoration |
| | H-2 | Surface Carbide Grinding | Concrete Pavement Restoration |
| | H-3 | Diamond Grooving | Concrete Pavement Restoration |
| I. Major (Heavy) Rehabilitation | I-1 | Cold In Place HMA Recycling (CIR) using Emulsified Asphalt | Cold-In-Place Recycling |
| | I-2 | Cold In Place HMA Recycling (CIR) using Foamed Asphalt | Cold-In-Place Recycling |
| | I-3 | Deep Grind and Thick Overlay | Grind, Patch and Resurface |
| | I-4 | Break/Crack & Seat and HMA Overlay | N/A |
| | I-5 | Rubbilization and HMA Overlay | N/A |
| J. Reconstruction | J-1 | Reconstruction using Cement Stabilized Aggregate Base | N/A |
| | J-2 | Reconstruction using Emulsified Asphalt Base | N/A |
| | J-3 | Reconstruction using GAB & HMA | N/A |
| | J-4 | Reconstruction using Lime-Stabilized Subgrade | N/A |
| | J-5 | Reconstruction using PCC | N/A |
| | J-6 | Reconstruction using Precast PCC Slabs | N/A |
| | J-7 | Reconstruction using Soil-Cement Base Course | N/A |
| | J-8 | Reconstruction using Roller Compacted Concrete | N/A |
| | J-9 | Reconstruction using Foamed Asphalt Base | N/A |
| | J-10 | Reconstruction using Lime Stabilized Base Course | N/A |
| | J-11 | Full-Depth Reclamation (FDR) | N/A |

# Table F: Pavement Fixes

| Category | Type of Activity | Increase Capacity | Increase Strength | Reduce Aging | Restore Serviceability | Specific Fixes (Including but not limited to) | |
|---|---|---|---|---|---|---|---|
| **Reconstruction** | Reconstruction | X | X | X | X | • Full-Depth Reclamation<br>• Reconstruction | |
| **Structural Rehabilitation** | Major (Heavy) Rehabilitation | | X | X | X | • Cold In-Place HMA Recycling (CIR)<br>• Break & Seat and Overlay<br>• Crack & Seat and Overlay<br>• Deep Grind and Thick Overlay<br>• Rubblization & Overlay | |
| | Structural Overlay | | X | X | X | • **Overlay or grind/overlay combination where grade increases more than 1.5"**<br>• Greater than 5% of project area has fatigue distresses needing patching<br>• Any concrete overlay | |
| **Pavement Preservation** | Minor (Light) Rehabilitation | | | X | X | • **Grade increase due to overlay or mill/overlay thickness is no more than 1.5",** and the project receives less than 5% patching for structural distress. | |
| | Preventive Maintenance | | | X | X | Asphalt-surfaced Pavements | • Cape seal<br>• Chip seal<br>• Crack filling<br>• Crack seal<br>• Diamond grinding<br>• Fog seal<br>• High-friction surface<br>• Hot In-Place Recycling (HIR)<br>• Microsurfacing<br>• Modified chip seal<br>• Patching<br>• Rejuvenators<br>• Sand seal<br>• Sandwich seal<br>• Scrub seal<br>• Slurry seal<br>• Thin and ultra-thin hot-mix asphalt overlay |
| | | | | X | X | Concrete-Surface Pavements | • Crack filling<br>• Crack sealing<br>• Cross-stitching<br>• Diamond grinding<br>• Diamond grooving<br>• Dowel-bar retrofit<br>• Joint sealing<br>• Slab stabilization<br>• Spall repair |
| **Reactive Maintenance** | Routine Maintenance | | | | X | • Cleaning of roadside ditches and structures<br>• Pothole patching | |
| | Corrective Maintenance | | | | X | • Pothole repair<br>• Patching of localized pavement deterioration, e.g. edge failures and/or grade separations along the shoulders<br>• Concrete joint replacement or joint sealing<br>• Concrete full-width and depth slab replacement at isolated locations | |
| | Catastrophic Maintenance | | | | X | • Sinkholes<br>• Water-main breaks<br>• Concrete pavement blow-ups | • Road washouts<br>• Avalanches<br>• Rockslides |

Notes: (1) Highlighted areas (Major Rehabilitation, Structural Overlay, Minor Rehabilitation and Preventative Maintenance) are those typically addressed by Fund 77.

# Table I

**Pavement Type: Flexible**
**ADT: 0 - 4,000**
**IRI: 0 - 100**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding / Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-3 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | | | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | | H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5 | | E-5 | F-1, F-2 | | | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5 | | E-5 | F-1, F-2 | | | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5 | | E-5 | F-1, F-2 | | H-3 | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5 | | E-5 | F-1, F-2 | | H-3 | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-2, C-3, C-5, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

| Table II | | | | Pavement Type: Flexible<br>ADT: 0 - 4,000<br>IRI: 101 - 170 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CI** | **Friction** | **Cracking** | **Rutting (in.)** | **A. Crack/Joint Seals** | **B. Asphalt Sealers / Rejuvenators** | **C. Aggregate Seals** | **D. Ultrathin HMA** | **E. Overlay** | **F. Patch** | **G. Joint Treatments** | **H. Grinding/ Grooving** | **I. Major (Heavy) Rehabilitation** | **J. Reconstruction** | **Do Nothing** |
| 0-50 | >40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | | | C-6 | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | C-6 | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | C-6 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | C-6 | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | C-6 | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | C-6 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-3, C-6 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | C-3, C-6 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | C-3, C-6 | D-1 | E-5,E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | C-3, C-6 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | C-3, C-6 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | C-3, C-6 | D-1 | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table III

**Pavement Type: Flexible**
**ADT: 0 - 4,000**
**IRI: > 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | X |
| | | | M | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | | X |
| | | | M | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| 76-100 | >40 | Load-Related | L | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | Non Load-Related | L | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | ≤ 40 | Load-Related | L | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | Non Load-Related | L | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |

Note: See Table E for Treatment Activities

# Table IV

**Pavement Type: Flexible**
**ADT: 4.001 - 25,000**
**IRI: 0 - 100**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-3 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | | | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | | H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | A-1, A-2 | B-1, B-2 | C-3, C-7 | | E-5 | F-1, F-2 | | | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | A-1, A-2 | B-1, B-2 | C-3, C-7 | | E-5 | F-1, F-2 | | | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | A-1, A-2 | B-1, B-2 | C-3, C-7 | D-1 | E-5 | F-1, F-2 | | H-3 | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | A-1, A-2 | B-1, B-2 | C-3, C-7 | D-1 | E-5 | F-1, F-2 | | H-3 | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

| Table V | | | | Pavement Type: Flexible<br>ADT: 4.001 - 25,000<br>IRI: 101 - 170 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CI** | **Friction** | **Cracking** | **Rutting (in.)** | **A. Crack/Joint Seals** | **B. Asphalt Sealers / Rejuvenators** | **C. Aggregate Seals** | **D. Ultrathin HMA** | **E. Overlay** | **F. Patch** | **G. Joint Treatments** | **H. Grinding/ Grooving** | **I. Major (Heavy) Rehabilitation** | **J. Reconstruction** | **Do Nothing** |
| 0-50 | >40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | | | | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-5, E-8, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table VI

**Pavement Type: Flexible**
**ADT: 4.001 - 25,000**
**IRI: > 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | X |
| | | | M | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | | X |
| | | | M | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| 76-100 | >40 | Load-Related | L | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | Non Load-Related | L | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | ≤ 40 | Load-Related | L | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | Non Load-Related | L | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |

Note: See Table E for Treatment Activities

# Table VII

**Pavement Type: Flexible**
**ADT: > 25,000**
**IRI: 0 - 100**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | | | | |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-3 | | | |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | | | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | | | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | | | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-3 | | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5 | F-1, F-2 | | | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5 | F-1, F-2 | | | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5 | F-1, F-2 | | H-3 | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5 | F-1, F-2 | | H-3 | | | X |
| | | | M | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table VIII

**Pavement Type: Flexible**
**ADT: > 25,000**
**IRI: 101 - 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-9, E-10, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | | | | | E-2, E-3, E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-2, E-3, E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | E-2, E-3, E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-2, E-3, E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table IX

**Pavement Type: Flexible**
**ADT: > 25,000**
**IRI: > 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2, I-3 | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-3 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| 76-100 | >40 | Load-Related | L | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | Non Load-Related | L | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | M | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | | | H | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | I-3 | | |
| | ≤ 40 | Load-Related | L | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | Non Load-Related | L | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | M | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |
| | | | H | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-3 | | |

Note: See Table E for Treatment Activities

# Table X

**Pavement Type: Composite**
**ADT: 0 - 4,000**
**IRI: 0 - 100**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | | | | |
| | | | M | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | X |
| | | | M | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | | | H | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-3 | | | |
| | | | M | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2, I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7 | | E-5 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7 | | E-5 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7 | D-1 | E-5 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7 | D-1 | E-5 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table XI

**Pavement Type: Composite**
**ADT: 0 - 4,000**
**IRI: 101 - 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2, I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | | | C-6 | | E-2,E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | C-6 | | E-2,E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | C-6 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | C-6 | | E-2,E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | C-6 | | E-2,E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | C-6 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-3, C-6 | D-1 | E-2, E-3,E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | C-3, C-6 | D-1 | E-2, E-3,E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | C-3, C-6 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | C-3, C-6 | D-1 | E-2, E-3,E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | C-3, C-6 | D-1 | E-2, E-3,E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | C-3, C-6 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table XII

**Pavement Type: Composite**
**ADT: 0 - 4,000**
**IRI: > 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2, I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | C-6 | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | C-3, C-6 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table XIII

**Pavement Type: Composite**
**ADT: 4,001 - 25,000**
**IRI: 0 - 100**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | | | | |
| | | | M | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | X |
| | | | M | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | | | H | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-3 | | | |
| | | | M | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | A-4 | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2, I-4. I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-4 | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7 | | E-5 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7 | | E-5 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7 | D-1 | E-5 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7 | D-1 | E-5 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table XIV

**Pavement Type: Composite**
**ADT: 4,001 - 25,000**
**IRI: 101 - 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-8, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2, I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | | | | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | | | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-2, E-3, E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-5, E-8, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table XV

**Pavement Type: Composite**
**ADT: 4,001 - 25,000**
**IRI: > 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-4, E-8, E-11,E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2, I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-4, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | M | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-4, E-5, E-8, E-11, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table XVI

**Pavement Type: Composite**
**ADT: > 25,000**
**IRI: 0 - 100**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | | | | |
| | | | M | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | X |
| | | | M | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | | | H | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-3 | | | |
| | | | M | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | A-4 | | | | E-8, E-9, E-10, E-14, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | I-1, I-2, I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | A-4 | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-4 | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-4 | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7, C-8 | | E-5 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | Non Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7, C-8 | | E-5 | F-1, F-2 | G-1, G-2 | | | | X |
| | | | M | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | | | H | A-1, A-2, A-3, A-4 | B-1, B-2 | C-3, C-7, C-8 | | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5 | F-1, F-2 | G-1, G-2 | H-3 | | | X |
| | | | M | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |
| | | | H | A-1, A-2, A-3 | B-1, B-2 | C-3, C-7, C-8 | D-1 | E-5, E-8, E-9, E-10, E-15 | F-1, F-2 | G-1, G-2 | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

# Table XVII

**Pavement Type: Composite**
**ADT: > 25,000**
**IRI: 101 - 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seals | B. Asphalt Sealers / Rejuvenators | C. Aggregate Seals | D. Ultrathin HMA | E. Overlay | F. Patch | G. Joint Treatments | H. Grinding/ Grooving | I. Major (Heavy) Rehabilitation | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2 | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | I-1, I-2, I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | | | | F-1, F-2 | | H-1, H-2, H-3 | | | X |
| | | | M | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | | | E-4, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-14, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| 76-100 | >40 | Load-Related | L | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | | | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | Non Load-Related | L | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | M | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |
| | | | H | | | C-3 | D-1 | E-4, E-5, E-6, E-7, E-8, E-9, E-10, E-11, E-12, E-13, E-15 | F-1, F-2 | | H-1, H-2, H-3 | | | |

Note: See Table E for Treatment Activities

## Table XVIII

**Pavement Type: Composite**
**ADT: > 25,000**
**IRI: > 170**

| CI | Friction | Cracking | Rutting (in.) | A. Crack/Joint Seal | B. Aggregate Seal | C. Overlay | D. Ultrathin HMA | E. Patch | F. Joint Treatment | G. Grooving | H. Grind | I. Surface Recycling | J. Reconstruction | Do Nothing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-50 | >40 | Load-Related | L | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | I-1, I-2 | | |
| | ≤ 40 | Load-Related | L | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| | | Non Load-Related | L | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | I-1, I-2 | | X |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | I-1, I-2 | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | I-1, I-2, I-4, I-5 | J-1, J-2, J-3, J-4, J-5, J-6, J-7, J-8, J-9, J-10, J-11 | |
| 51-75 | >40 | Load-Related | L | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | X |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | X |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | Non Load-Related | L | | | | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | X |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| 76-100 | >40 | Load-Related | L | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | Non Load-Related | L | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | | M | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | | | H | | | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | | E-1, E-2 | F-1, F-2 | | H-1, H-2 | | | |
| | ≤ 40 | Load-Related | L | | B-3 | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | D-1 | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | | M | | B-3 | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | D-1 | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | | H | | B-3 | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | D-1 | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | Non Load-Related | L | | B-3 | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | D-1 | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | | M | | B-3 | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | D-1 | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |
| | | | H | | B-3 | C-4, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15 | D-1 | E-1, E-2 | F-1, F-2 | G-1 | H-1, H-2 | | | |

Note: See Table E for Treatment Activities

| Table XIX | Pavement Type: Rigid<br>Patching < 25% | | | |
|---|---|---|---|---|
| **Structural Distress** | **Cracking** | **Pumping** | **Joint/Crack Deterioration (including Faulting)** | **Punchouts** |
| **Punchouts** | Crack/Joint Seals (A-2)<br>Patch (F-4)<br>Joint Treatments (G-1, G-2) | Patch (F-4)<br>Joint Treatment (G-2, G-3)<br>Drainage Improvements | Crack/Joint Seals (A-2, A-3, A-4)<br>Overlay (E-1, E-2, E-3, E-8, E-11, E-14, E-15)<br>Patch (F-3, F-4) | Patch (F-4) |
| **Joint/Crack Deterioration (including Faulting)** | Crack/Joint Seals (A-2, A-3, A-4)<br>Overlay (E-1, E-2, E-3, E-8, E-11, E-14, E-15)<br>Patch (F-3, F-4)<br>Joint Treatments (G-1, G-2) | Crack/Joint Seals (A-3, A-4)<br>Overlay (E-1, E-2, E-3, E-8, E-11, E-14, E-15)<br>Joint Treatments (G-2, G-3)<br>Patch (F-3, F-4)<br>Drainage Improvements | Crack/Joint Seals (A-2, A-3, A-4)<br>Overlay (E-1, E-2, E-3, E-8, E-11, E-14, E-15)<br>Patch (F-3, F-4) | |
| **Pumping** | Crack/Joint Seals (A-2)<br>Patch (F-4)<br>Joint Treatments (G-1, G-2, G-3)<br>Drainage Improvements | Patch (F-4)<br>Joint Treatments (G-2, G-3)<br>Drainage Improvements | | |
| **Cracking** | Crack/Joint Seals (A-2)<br>Patch (F-3, F-4)<br>Joint Treatments (G-1, G-2) | | | |

Notes: 1. Refer to the Concrete Distress Paver Manual of the U.S. Army Corps of Engineers for definitions of distresses.

2. If functional distresses (scaling, popouts, shrinkage cracks, etc.) are present, consider Grinding (H-1, H-2).

3. If shallow durability problems such as "D" cracking, and Alkali Silica Reactivity (ASR) are present, consider Grinding (H-1, H-2) and Overlay (E-1, E-2, E-3, E-8, E-11, E-14). It should be noted that Grinding (H-1, H-2) and Overlay (E-1, E-2, E-3, E-8, E-11, E-14) do not address the systemic problems associated with "D" cracking and ASR, and are only temporary solutions to the durability problems. Coordinate with PAGD to determine a permanent solution.

4. To delay Joint Reflective Cracking, use a minimum HMA overlay thickness of 4" over Jointed Concrete Pavement, unless Crack/Joint Seals (A-4) is performed.

# Appendix A: Definitions

## A. Crack / Joint Seals:

### A-1: Crack Filling

A process that consists of placing a generally bituminous material into "**non-working**" cracks to substantially reduce water infiltration and reinforce adjacent top-down cracks. Non-working cracks are cracks that have vertical or horizontal movement of less than 2.5mm (1/10$^{th}$ inch), and are typically diagonal or longitudinal cracks.

### A-2: Crack Seal (Concrete-Surfaced pavements)

An operation involving thorough crack preparation and placement of high quality material into or over candidate cracks to significantly reduce moisture infiltration and to retard the rate of crack deterioration. Sealed candidates in the concrete pavements deteriorate less and contribute less to the deterioration of the pavements. Concrete cracks are typically sealed with thermosetting bituminous material.

### Crack Seal (Asphalt-Surfaced pavements)

The process of placing higher-quality material into or on top of "**working**" cracks in order to reduce water infiltration into a pavement. Working cracks are cracks that have vertical or horizontal movement of at least 2.5mm (1/10$^{th}$ inch), and are typically transverse and reflective cracks.

In contrast with crack **filling**, crack **sealing** requires more crack preparation procedures and uses higher-quality sealant materials.

### A-3: Joint Sealing (and Resealing)

Sealing (and Resealing) transverse joints in concrete pavements is intended to minimize the infiltration of surface water into the underlying pavement structure and to prevent the intrusion of incompressibles into the joints. A range of materials from bitumen to silicone to neoprene is used in design configurations. Neoprene is rarely if ever used on resealing projects.

### A-4: Saw and Seal

A method of controlling reflective cracking in HMA overlays that involves sawing joints in the new overlay exactly over the joints in the existing pavement.

## B. Asphalt Sealers / Rejuvenators:

### B-1: Asphalt Sealers

Very light applications of a diluted asphalt emulsion (1 part emulsion + 1 part water) placed directly on the pavement surface with no aggregate. Typical application rates range from 0.05 to 0.1 gal per SY.

### B-2: Fog Seals / Rejuvenators

Specialized emulsions of maltenes (2 parts maltene + 1 part water) that are sprayed on an existing asphalt surface with the intent of softening the existing binder, enriching the oxidized pavement, thereby reducing thermal cracking and

inhibiting raveling. The emulsions used are typically mixtures of asphalt, polymer latex, and other additives, such as softening agents. An asphalt binder consists of maltenes and asphaltenes. Asphaltenes are unaffected by the environment. Maltenes are affected by the environment, and their loss causes brittleness in the asphalt leading to weathering/raveling. The function of fog seals/rejuvenators is to restore maltenes to the asphalt binder.

## C. Aggregate Seals:

### C-1: Cape Seal

A surface treatment that involves the application of a slurry seal or microsurfacing to a newly constructed chip seal. Cape seals are used to provide a dense water proof surface with improved skid resistance and smoother ride.

### C-2: Chip Seal

Asphalt (commonly as emulsion) is applied directly to the pavement surface followed by the application of aggregate chips, which are then immediately rolled to embed chips. Application rates depend upon surface condition, aggregate gradation and maximum size. Chip seal can be applied in multiple layers (i.e., double chip seals). In addition, there are high-performance chip seals and modified chip seals in use. Use of stone obtained as a by-product from SMA is ideal, as it provides a uniform single-sized stone.

### Modified Chip Seal

When the asphalt emulsion is modified with a blend of ground tire or latex rubber or polymer modifiers to enhance the elasticity and adhesion characteristics, it is called a modified chip seal.

### High-performance Chip Seal

A synchronized continuous application of ultra fast polymer asphalt emulsion and single-size durable aggregate.

### C-3: High Friction Surface

An ultrathin, uniformly graded friction improvement course bonded to existing pavement with epoxy. The aggregate material is typically calcined bauxite. The epoxy bonds well to both HMA and PCC surfaces. A variety of colors are available for traffic calming purposes. Significantly improves skid resistance. Typically used for spot treatments to address wet accident locations, tight curves, or heavy braking locations.

### C-4: Sand Seal

A thin asphalt surface treatment constructed by spraying a non-diluted emulsion, spreading a thin layer of fine aggregate (i.e. sand), and rolling. Sand seals are typically 0.1 to 0.2 in thick. The primary purpose of a sand seal is to increase surface friction; however, in some cases, sand seals are used to "lock" the aggregates in a chip seal.

### C-5: Sandwich Seal

An application of a one-layer course of aggregate particles, followed by an application of an emulsion, followed by a second course of smaller aggregates to fill the voids. The term sandwich is derived from the fact that the asphalt

application is placed between the two layers of the aggregate. There is a possible placement of emulsion before the coarse aggregate.

**C-6: Scrub Seal**
A thin asphalt surface treatment constructed by spraying a polymer-modified emulsion onto an existing pavement, dragging a broom across the surface to scrub the emulsified asphalt into the surface cracks, immediately spreading a thin fine aggregate (i.e. sand or screenings) over the emulsified asphalt, dragging another broom over the surface to scrub the fine aggregate into the emulsion and the surface cracks, and rolling the surface with a pneumatic tire roller. Thicknesses generally range from 0.4 to 0.75 in.

**C-7: Slurry Seal**
Similar to microsurfacing, slurry seals are mixtures of well-graded aggregate (fine sand and mineral filler) and asphalt emulsion spread over the entire pavement surface with either a squeegee or spreader box attached to the back of a truck. Slurry seals are effective in sealing low-severity surface cracks, waterproofing the pavement surface, and improving skid resistance at speeds below 30 mph. Thickness is generally < 0.4 in. They are not effective where the underlying pavement experiences vertical movement due to load. Placement requirements are fairly stringent and include limitations on temperature, traffic, and moisture.

**C-8: Microsurfacing (aka in MDSHA as Latex-Modified Slurry Seal)**
Microsurfacing is a mixture of polymer-modified asphalt emulsion, crushed dense graded aggregate, mineral filler, additives, and water. Micro-surfacing provides thin resurfacing of 10 to 20 mm (3/8- to ¾- inches) to the pavement and returns traffic use in one hour under average conditions. Materials selection and mixture design make it possible for micro-surfacing to be applied in multiple applications and provide minor re-profiling. The product can fill wheel ruts up to 40 mm (1.5 in.) in depth in one pass and produces high surface friction values. Micro-surfacing is suitable for use on limited access, high-speed highways as well as residential streets, arterials and roadways.

## D. Ultrathin HMA:

**D-1: Ultrathin Bonded Wearing Course (Asphalt)**
A gap-graded or open-graded ultra thin Hot-Mix specialized membrane for bonding using innovative equipment, over a thick polymer modified asphalt emulsion membrane. Lift thickness ranges from 5/8" to an inch. Can be applied on asphalt and concrete pavement surfaces.

## E. Overlay:

**E-1: HMA Overlay – Open Graded Friction Course**
Open Graded Friction Course is a surface course with an aggregate gradation that provides an open void structure as compared with conventional dense graded asphalt concrete. Air void content typically ranges from 15-25%, resulting in a highly permeable mixture relative to conventional HMA, which is typically impermeable.

**E-2: HMA Overlay – Ultrathin (<1.5")**
Plant Mix Combinations of Asphalt Cement and Aggregate applied to pavement in thicknesses between 0.75" to 1.5". Dense graded, open graded, and stone matrix mixes are all used. Like all overlays, a tack coat is required before placement of the overlay. Polymer modification should be specified for binders in thin wearing surfaces. (0.75" or less).

**E-3: HMA Overlay – Ultrathin (<1.5") (High Performance Thin Overlay)**
Plant Mix Combinations of Asphalt Cement and Aggregate applied to pavement in thicknesses between 0.75" to 1.5". This typically includes a high percentage of polymer-modified binder, resulting in a more crack-resistant wearing course than a dense-graded mix.

**E-4: Grind and HMA Overlay – 64-22/28, w/ or w/o 8PV**
This activity is a combination of grinding the existing pavement surface up to 4" and overlaying with Hot-Mix Asphalt 64-22/28, with or without 8PV mix. 8PV mix is recommended when the existing Friction Number is less than 40, when high wear-and-tear of the pavement surface is expected, or where there is a high occurrence of wet weather accidents.

**E-5: Hot In-Place HMA Recycling (HIR)**
A process which consists of softening the existing asphalt surface with heat, mechanically removing the softened surface material (typically 1 to 2 inches), mixing the material with a recycling agent, adding virgin asphalt and aggregate to the material (if required), and then replacing the material on the pavement.

**E-6: Grind and HMA Overlay – GAP –SMA**
This activity is a combination of grinding the existing pavement surface up to 4" and overlaying with Gap-Graded Stone-Matrix Asphalt (SMA). Gap Graded mixes are recommended on Freeways/Expressways.

**E-7: Grind and HMA Overlay – 76-22, Dense 8PV**
This activity is a combination of grinding the existing pavement surface up to 4" and overlaying with Hot-Mix Asphalt 76-22, with 8PV mix. 8PV mix is recommended when the existing Friction Number is less than 40, when high wear-and-tear of the pavement surface is expected, or where there is a high occurrence of wet weather accidents. The use of 76-22 binder is generally recommended where surface rutting is anticipated.

**E-8: HMA Overlay – 64-22/28, w/ or w/o 8PV**
This activity consists of overlaying with Hot-Mix Asphalt 64-22/28, with or without 8PV mix. 8PV mix is recommended when the existing Friction Number is less than 40, when high wear-and-tear of the pavement surface is expected, or where there is a high occurrence of wet weather accidents.

**E-9: HMA Overlay – GAP –SMA**
This activity consists of overlaying with Gap-Graded Stone-Matrix Asphalt (SMA). Gap Graded mixes are recommended on Freeways/Expressways.

**E-10: HMA Overlay – 76-22, Dense 8PV**
This activity consists of overlaying with Hot-Mix Asphalt 76-22, with 8PV mix. 8PV mix is recommended when the existing Friction Number is less than 40, when high wear-and-tear of the pavement surface is expected, or where there is a high occurrence of wet weather accidents. The use of 76-22 binder is generally recommended where surface rutting is anticipated.

**E-11: Wedge/Level and HMA Overlay – 64-22/28, w/ or w/o 8PV**
This activity is a combination of placing a Wedge/level layer on the existing pavement surface and overlaying with Hot-Mix Asphalt 64-22/28, with or without 8PV mix. Wedge/level is a layer of variable HMA thickness used for grade or cross-slope adjustments, as a structural layer, and to improve ride quality. 8PV surface mix is recommended when the existing Friction Number is less than 40, when high wear-and-tear of the pavement surface is expected, or where there is a high occurrence of wet weather accidents.

**E-12: Wedge/Level and HMA Overlay – GAP –SMA**
This activity is a combination of placing a Wedge/level layer on the existing pavement surface and overlaying with Gap-Graded Stone-Matrix Asphalt (SMA). Wedge/level is a layer of variable HMA thickness used for grade or cross-slope adjustments, as a structural layer, and to improve ride quality. Gap Graded mixes are recommended on Freeways/Expressways.

**E-13: Wedge/Level and HMA Overlay – 76-22, Dense 8PV**
This activity is a combination of placing a Wedge/level layer on the existing pavement surface and overlaying with Hot-Mix Asphalt 76-22, with 8PV mix. 8PV mix is recommended when the existing Friction Number is less than 40, when high wear-and-tear of the pavement surface is expected, or where there is a high occurrence of wet weather accidents. The use of 76-22 binder is generally recommended where surface rutting is anticipated.

**E-14: PCC Overlay – Unbonded (HMA-Surfaced pavements)**
Unbonded overlays are basically new pavements constructed on an existing stable platform. It is a 4" - 11" PCC layer as applied on an existing flexible or composite pavement. It is generally unbonded, but may be partially bonded to the existing HMA to increase the load carrying capacity.

**PCC Overlay – Unbonded (PCC-Surfaced pavements)**
Placement of a PCC overlay on a rigid pavement. Prior to placement of a PCC overlay, a bond breaker is placed to isolate the two PCC layers. The bond breaker is typically a 1"-2" HMA overlay directly on the old PCC pavement prior to the placement of the new PCC overlay. The bond breaker is designed to allow the two PCC layers to move independently and limit the amount of reflective cracking. Typical thickness ranges from 6" - 10". Thicknesses as low as 4” have been placed.

**E-15: PCC Overlay – Bonded**
Placement of a PCC overlay on a rigid/flexible pavement. Additional care and construction practices are taken to ensure a good bond between underlying pavement and new overlay. Typical thickness ranges from 2" - 5".

## F. Patch:

### F-1: HMA Partial Depth

This consists of the removal of areas of unsound pavement material up to 50% of the pavement thickness and replacement with HMA. The pavement thickness is defined as the thickness of all bound materials in the pavement structure, including HMA, PCC and any other asphalt or cement modified materials.

### F-2: HMA Full Depth

This consists of the removal of the full thickness of the pavement material to the top of the aggregate base material and replacement with HMA. This is used when more than 50% of the pavement thickness requires repair.

### F-3: PCC Partial Depth (Spall Repair)

Partial depth repairs are defined as the removal of small, shallow (less than 1/3 of the thickness of the concrete pavement) areas of deteriorated PCC that are then replaced with a suitable material. These repairs restore structural integrity and improve ride quality, thereby extending the service life of the pavements that have spalled or distressed joints.

### F-4: PCC Full Depth Repair

Full-Depth Repairs (FDR) are cast in-place PCC repairs that extend through the full thickness of the existing PCC slab. The technique involves the full-depth removal and replacement of a full or half lane width areas of an existing deteriorated PCC pavement. The minimum specified repair length is typically 6 feet. However, it may be more cost effective and reliable to replace a large area rather than placing a series of short repairs.

Note: HMA material shall not be used to patch concrete pavements.

## G. Joint Treatments:

### G-1: Cross-stitching

A **longitudinal** crack and joint repair technique that consists of grouting tie bars in holes drilled across non-working longitudinal cracks/joints at an angle to the pavement surface. Cross-stitching prevents horizontal and vertical crack movements.

### G-2: Dowel Bar Retrofit

Placement of load transfer devices across joints or cracks in an existing jointed concrete pavement to restore load transfer at the joints. Poor load transfer can lead to pumping, faulting and corner breaks. Slots are cut, concrete removed, dowel bars inserted, backfill material filled, the surface finished, cured, and most often diamond ground.

### G-3: Undersealing /Slab Stabilization

The pressure insertion of flowable material beneath the concrete slab to fill voids between the slab and the base, thereby reducing the deflections and consequently, deflection-related distresses such as pumping or faulting. It is most often performed at areas where pumping or loss of support occur, such as

beneath transverse joints and deteriorated cracks. The voids being filled by this technique are generally less than 3 mm (0.12") thick.

## H. Grind:

### H-1: Diamond Grinding – Asphalt-Surfaced Pavements

The removal of a thin layer of HMA, generally about 1/16" to 0.25", from the surface of the pavement using special equipment outfitted with a series of closely spaced diamond saw blades.

### Diamond Grinding – Concrete-Surfaced Pavements

It is the removal of a thin layer of concrete, generally about 3/16" to 0.25", from the surface of the pavement using special equipment outfitted with a series of closely spaced diamond saw blades.

### H-2: Surface Carbide Grinding

Grinding an existing pavement with carbide tipped grinding teeth resulting in a pavement surface with a transverse pattern of 0.2" center to center of each strike area and with a difference of high and low of the matted surface not exceeding $1/16^{th}$ of an inch. This is different from milling, which maintains a tolerance of $\pm 1/8^{th}$ of an inch.

### H-3: Diamond Grooving

A surface restoration procedure which can be performed on both PCC and HMA pavements. This procedure involves the use of diamond saw blades, with a typical spacing of 3/4" on center, to cut parallel grooves into the pavement surface. It can be performed in both longitudinal and transverse directions. Diamond grooving should be applied to pavements with sound structural and functional characteristics. The purpose of diamond grooving is to improve wet weather pavement/tire interaction.

## I. Major (Heavy) Rehabilitation:

### I-1: Cold In-Place HMA Recycling using Emulsified Asphalt

A process in which a portion of an existing bituminous pavement is pulverized or milled, and then the reclaimed material is mixed with new binder and, when needed, virgin aggregates. The binder used most often is emulsified asphalt with or without a softening agent. The resultant blend is placed as a base for a subsequent overlay or surface treatment.

### I-2: Cold In-Place HMA Recycling using Foamed Asphalt

A process in which a portion of an existing bituminous pavement is pulverized or milled, and then the reclaimed material is mixed with new foamed binder and, when needed, virgin aggregates, lime, or cement. The binder used is neat 64-22 asphalt. The resultant blend is placed as a base for a subsequent overlay or surface treatment.

### I-3: Deep Grind and Thick Overlay

Removal of several layers of existing pavement, followed by placement of at least 4" HMA or PCC overlay. At least a portion of the base layer is left in place,

and the subgrade is not disturbed. This is usually done in cases where the grade must be maintained or lowered and additional structure is needed, and the way to achieve that is to essentially substitute unbound aggregate with stronger HMA or PCC.

**I-4: Break/Crack & Seat and HMA Overlay**
Placement of a HMA overlay on a jointed concrete pavement (JCP) that has been altered via break/crack and seat. The break/crack and seat method differs from rubblization in that a large percentage of the structural integrity of a rigid pavement remains following a break/crack and seat operation. The break/crack and seat operation involves breaking the existing slab in much shorter slabs followed by compaction of those smaller slabs to "seat" them. This operation is designed to limit the potential for reflective cracking while maintaining a majority of the structural capacity of the rigid pavement. The Break and Seat technique is applied to Jointed **Reinforced** Concrete Pavements (JRCP), while Crack and Seat technique is applied to Jointed **Plain** Concrete Pavements (JPCP). Break and Seat involves breaking the concrete to pieces of 1 to 2 $ft^2$ in size, and Crack and Seal involves breaking the concrete to pieces of 1 to 3 $ft^2$ in size. For Break and Seat, the reinforcing steel must be ruptured, or the bond must be broken.

**I-5: Rubbilization and HMA Overlay**
Placement of an HMA overlay on a rigid pavement that has been structurally altered via rubblization. Rubblization involves breaking the PCC layer into smaller pieces of less than 6.0" in diameter. This effectively creates a cement treated aggregate base from the rigid pavement. Rubblization is generally completed to eliminate the potential for reflective cracking. Rubblization is generally completed on rigid pavements that are beyond their structural life, or are experiencing materials or construction problems that can not otherwise be addressed.

## J. Reconstruction:

**J-1: Reconstruction using Cement Stabilized Aggregate Base**
Cement Stabilized Aggregate Base (CSAB) consists of aggregate, Portland cement, and water. This activity consists of placing CSAB, followed by Base and/or Surface Courses

**J-2: Reconstruction using Emulsified Asphalt Base**
Complete reconstruction of the existing pavement type with a flexible pavement design, using emulsified asphalt base.

**J-3: Reconstruction using GAB and HMA**
Complete reconstruction of the existing pavement type with a flexible pavement design.

**J-4: Reconstruction using Lime Stabilized Subgrade**
A process by which the full flexible pavement section consisting of asphalt, base, subbase are placed over a predetermined portion of the underlying soil subgrade, which is uniformly pulverized and blended with lime kiln dust (LKD) resulting in a stabilized subbase course.

**J-5: Reconstruction using PCC**
Complete reconstruction of the existing pavement type with a rigid pavement design, using cast in-place concrete.

**J-6: Reconstruction using Pre-Cast PCC Slabs**
Complete reconstruction of the existing pavement type with a rigid pavement design, using precast PCC slabs.

**J-7: Reconstruction using Soil-Cement Base Course**
A process by which the full flexible pavement section consisting of asphalt, base, subbase, and a predetermined portion of the underlying soil subgrade are mixed with cement to increase the soil strength.

**J-8: Reconstruction using Roller Compacted Concrete**
Roller Compacted Concrete (RCC) takes its name from the construction method used to build it. It's placed with conventional or high-density asphalt paving equipment, then compacted with rollers. RCC is a stiff, zero slump concrete mixture that is mixed, placed and has the same basic ingredients as conventional concrete (cement, water and aggregate, etc). Unlike conventional concrete, it's a drier mix stiff enough to be compacted by vibratory rollers.

**J-9: Reconstruction using Foamed Asphalt Base**
Complete reconstruction of the existing pavement type with a flexible pavement design, using foamed asphalt base.

**J-10: Reconstruction using Lime Stabilized Base Course**
A process by which the full flexible pavement section consisting of asphalt, base, subbase, and a predetermined portion of the underlying soil subgrade are uniformly pulverized and blended with lime kiln dust (LKD) resulting in a stabilized base course.

**J-11: Full-Depth Reclamation (FDR)**
Technique in which the full thickness of the asphalt pavement and a predetermined portion of the underlying material (base, subbase and/or subgrade) is uniformly pulverized and blended to provide an upgraded, homogeneous base material. FDR is performed on the roadway without the addition of heat, similar to CIR. Treatment depths vary depending on the thickness of the existing pavement structure, but generally range between 4 to 12 inches. FDR consists of pulverization/reclamation of the existing pavement materials, adding more materials (when necessary), mixing, initial shaping of the resultant mix, compaction, final shaping or “tight blading”, and application of a bituminous surface or wearing course.

# Appendix B: Supplemental Treatment Information

| Table B.1 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS A-1 THROUGH A-4 | | | | |
|---|---|---|---|---|---|---|
| | | A-1. Crack Filling | A-2. Crack Seal | | A-3. Joint Sealing (and Resealing) | A-4. Saw and Seal |
| | | | Asphalt-Surfaced Pavements | Concrete-Surfaced Pavements | | |
| Treatment Advantages | | 1. Slows/ Reduces Moisture Damage<br>2. Slows/Reduces Cracking and Rutting<br>3. Performs well in all climatic conditions<br>4. Performance is not significantly affected by varying ADT or truck levels<br>5. Prevents incompressibles from entering cracks. | 1. Slows/ Reduces Moisture Damage<br>2. Slows/Reduces Cracking and Rutting<br>3. Performs well in all climatic conditions<br>4. Performance is not significantly affected by varying ADT or truck levels<br>5. Prevents incompressibles from entering crack joints | 1. Reduces or delays moisture damage, further crack deterioration and roughness associated with increasing distresses.<br>2. Performance is not significantly affected by varying ADT or truck levels | 1. Helps prevent moisture and incompressibles out of the joints resulting in less cracking, pumping, spalling and faulting. | 1. Prevents joint reflective cracking and spalling.<br>2. Provides maintainable joints.<br>3. Relatively inexpensive compared to other joint reflective crack mitigation techniques such as Reflective Crack Relief Interlayer (RCRI). |
| Treatment Disadvantages | | 1. Adds no structural benefit.<br>2. Damages the aesthetic look of the pavement<br>3. May reduce friction if used extensively in wheel paths<br>4. Applicable only for non-working cracks | 1. Requires more substantial crack preparation compared to crack filling.<br>2. Applicable only for "working" cracks.<br>3. May reduce friction if used extensively in wheel paths<br>4. Damages the aesthetic look of the pavement<br>5. Adds no structural benefit. | 1. Roughness may increase as a result of the sealing process.<br>2. Transverse cracking should not be sealed in CRCP. | 1. Requires joint preparation before placement (needs to be cleaned, routed, old sealant removed).<br>2. Performance is environment-dependant, and may not work in all environments. | 1. It is crucial to sawcut at the location of the PCC joints to achieve the desired performance.<br>2. It is difficult to identify the location of joints after the placement of the asphalt overlay |
| Cost Clarification | Small Quantity Cost | > $0.30 per linear feet per NHI<br>> $2.50 per linear feet per MD Price Index | > $0.60 - $1.00 per linear feet per NHI | $0.75 - $1.25 / LF for hot-pour rubberized materials. | $0.75 - $1.25 / LF for poured asphalt sealant, $1 - $2 / LF for silicone sealant. | $1.25 - $1.50 / LF |
| | Medium Quantity Cost | $0.30 per linear feet per NHI<br>$2.50 per linear feet per MD Price Index | $0.60 - $1.00 per linear feet per NHI | $0.75 - $1.25 / LF for hot-pour rubberized materials. | $0.75 - $1.25 / LF for poured asphalt sealant, $1 - $2 / LF for silicone sealant. | |
| | High Quantity Cost | $0.30 per linear feet per NHI<br>$2.50 per linear feet per MD Price Index | $0.60 - $1.00 per linear feet per NHI | $0.75 - $1.25 / LF for hot-pour rubberized materials. | $0.75 - $1.25 / LF for poured asphalt sealant, $1 - $2 / LF for silicone sealant. | |
| | Items Included | Minimal crack preparation, low-quality thermoplastic sealant materials | Crack preparation procedures, high-quality thermoplastc sealant materials | Crack refacing, cleaning, backer rod installation and application of sealant. | Routing, sealant removal, joint refacing, reservoir cleaning, backer rod installation and sealant installation. | Saw and Seal, Joint Filling, and all preparation work. |
| | Items Excluded | Marking Removal | Marking Removal | Unknown | Unknown | HMA Overlay Cost |
| Typical Service Life | | 2-4 years | 2-10 years | | 4-8 years for hot-poured asphalt sealant, approximately 8 years for silicone sealant, 3-5 years for asphalt rubber sealant. | Depends on the thickness of the overlay placed. |
| MOT Considerations / Cure time | | 1. Traffic passing over a hot applied sealed or filled crack is usually not an issue. However, traffic control during the application of the treatment should be in effect long enough to allow for adequate curing of the product and prevent tracking.<br>2. Hot applied rubber modified sealants, especially asphalt rubber, have excellent adhesion and do not require the application of a thin sand coating prior to trafficking. Emulsions must be sand coated prior to being trafficked. | 1. Traffic passing over a hot applied sealed or filled crack is usually not an issue. However, traffic control during the application of the treatment should be in effect long enough to allow for adequate curing of the product and prevent tracking.<br>2. Hot applied rubber modified sealants, especially asphalt rubber, have excellent adhesion and do not require the application of a thin sand coating prior to trafficking. Emulsions must be sand coated prior to being trafficked. | | 1. Traffic passing over a hot applied sealed or filled joint is usually not an issue. However, traffic control during the application of the treatment should be in effect long enough to allow for adequate curing of the product and prevent tracking.<br>2. Hot applied rubber modified sealants, especially asphalt rubber, have excellent adhesion and do not require the application of a thin sand coating prior to trafficking. Emulsions must be sand coated prior to being trafficked. | See "A-1. Crack Filling" and "A-3. Joint Sealing (and Resealing)" for cure times |

| Table B.2 | SUPPLEMENTAL INFORMATION FOR TREATMENTS B-1, B-2, C-1 THROUGH C-3 | | | | |
|---|---|---|---|---|---|
| | **B-1. Asphalt Sealers** | **B-2. Fog Seals / Rejuvenators** | **C-1. Cape Seal** | **C-2. Chip Seal (Modified)** | **C-3. High Friction Surface** |
| **Treatment Advantages** | 1. Performs well in all climatic conditions<br>2. Inexpensive treatment<br>3. Improves sealing or waterproofing<br>4. Facilitates aggregate retention in chip seal applications or weathered/raveled pavements | 1. Slows/reduces raveling and roughness and may slow rate of thermal cracking<br>2. Used in some surface recycling process.<br>3. Improves flexibility of asphalt binder. | 1. Low cost<br>2. Flexibility of Chip Seal<br>3. Smoothness of Slurry Seal | 1. Low cost<br>2. Reduced overspray<br>3. Improves friction | 1. Results in extremely high skid numbers.<br>2. Compatible with closed sections because it is extremely thin (about 1/4")<br>3. Available in several colors for traffic calming purposes.<br>4. Can be applied to asphalt or concrete surfaces. |
| **Treatment Disadvantages** | 1. Increased ADT or truck levels can increase surface wear, particulary when studded tires are used.<br>2. Typically,a slow setting emulsion is used which requires time to "break". Hence, the pavement is sometimes closed for several hours for curing before being re-opened to traffic.<br>3. Can have a negative impact on friction and stripping | 1. Allow time for adequate surface friction to be restored.<br>2. May not be appropriate for rubberized asphalt concrete or polymer modified mixes.<br>3. Not appropriate for pavements with inadequate friction | 1. Cannot be opened to traffic until several hours after the operations are complete. | 1. Cannot be opened to traffic several hours after the operations are complete.<br>2. Aggregate chips cracking windshields<br>3. Potential snow plow problems<br>4. Not bicycle compatible | 1. Cures about an hour after epoxy is poured, so aggregate needs to be placed immediately, to facilitate appropriate bond.<br>2. Expensive, because it is an emerging technology. Costs may come down with increased usage.<br>3. Some colors will wear in the wheel paths. |
| **Cost Clarification** – **Small Quantity Cost** | $0.06 - $0.36 / SY | $0.15 - $0.65 / SY | Approx. $5 / SY | Single Chip Seal: $0.80 - $1.75 / SY<br>Double Chip Seal: $1.20 to $2.50 / SY | $25 - $40 / SY |
| **Medium Quantity Cost** | $0.06 - $0.36 / SY | $0.15 - $0.65 / SY | | | |
| **High Quantity Cost** | $0.06 - $0.36 / SY | $0.15 - $0.65 / SY | | | |
| **Items Included** | See Defintion | See Definition | Chip Seal, Microsurfacing | See Definition | Epoxy, aggregate and placement |
| **Items Excluded** | Marking Removal | Marking Removal | Marking Removal | Marking Removal | MOT, Marking Removal |
| **Typical Service Life** | 1-4 years | 3-5 years | 2-5 years | 4-6 years for Single, 5-7 years for Double | Anticipated to be 10-15 years |
| **MOT Considerations / Cure time** | At least two hours and until acceptable skid test values are achieved. | At least two hours and until acceptable skid test values are achieved. | Cure time contingent on placement of chip seal followed by slurry seal/microsurfacing. Refer to chip seal, slurry seal and microsurfacing for individual cure times. | Cure time generally varies from 1 to 4 hours before sweeping to dislodge loose aggregate | Cure time is generally 1 hour after placement. |

| Table B.3 | SUPPLEMENTAL INFORMATION FOR TREATMENTS C-4 THROUGH C-8 | | | | |
|---|---|---|---|---|---|
| | **C-4.Sand Seal** | **C-5.Sandwich Seal** | **C-6.Scrub Seal** | **C-7.Slurry Seal** | **C-8.Microsurfacing** |
| **Treatment Advantages** | 1. Prevents/delays oxidation of the pavement surface.<br>2. Seals the pavement surface (including temporary sealing low severity fatigue cracking)<br>3. Successful on both low- and high- volume roadways.<br>4. Corrects poor friction.<br>5. Slows/reduces severity of moisture damage, cracking, raveling and possibly roughness and rutting. | 1. Unlike the double chip seal, only one application of emulsion is required.<br>2. Same service life as the double chip seal<br>3. Provides a smoother surface than chip seal | 1. Prevents/delays moisture damage.<br>2. Rejuvenates hardened/oxidized asphalt.<br>3. Improves poor friction.<br>4. Reduces the severity of cracking, raveling and possibly roughness and rutting. | 1. Prevents/delays oxidation of the pavement surface.<br>2. Seals the pavement surface.<br>3. Temporarily seals small cracks and surface imperfections, waterproof the surface, and protects the pavement structure of both asphalt and concrete pavements.<br>4. Should be used on projects with sound and well drained bases, surfaces, and shoulders. | 1. Prevents/delays oxidation of the pavement surface.<br>2. Seals the pavement surface (including temporary sealing low severity fatigue cracking)<br>3. Successful on both low- and high-volume roadways. |
| **Treatment Disadvantages** | 1. Negatively affects stripping.<br>2. Limited to lower volume traffic conditions with a low percentage of trucks, and roadway grades flatter than 8%.<br>3. Should be constructed when surface is dry and the temperature is at least 50 deg F<br>4. To ensure good bond, existing pavement must be clean and dry. | 1. Clean aggregate required.<br>2. Aggregate chips may crack windshields.<br>3. Must be placed on structurally sound pavements. | 1. Can accelerate the development of stripping.<br>2. Limited to lower volume traffic conditions (AADT < 1,500) with a low percentage of trucks, and roadway grades flatter than 8%.<br>3. May be susceptible to snow plow damage.<br>4. Must be placed on a clean dry surface at a temperature of at least 50 deg F.<br>5. Must be placed on structurally sound pavements. | 1. Can accelerate the development of stripping.<br>2. Performance in terms of surface wear is affected by increasing ADT and truck levels.<br>3. Potential to add splash/spray and ponding (if there are surface irregularities)<br>4. Must be placed on structurally sound pavements. | 1. Can accelerate the development of stripping.<br>2. It will not prevent working cracks from penetrating through the pavement surface.<br>3. Placement in cool weather may lead to early raveling.<br>4. Requires special equipment for placement.<br>5. Must be placed on structurally sound pavements. |
| **Cost Clarification** – **Small Quantity Cost** | $0.33 to $0.66/SY | $1 - $2 / SY | $0.50 - $2.15 /SY | $ 0.75 - $2.60 /SY | $1.25 - $3/SY |
| **Medium Quantity Cost** | $0.33 to $0.66/SY | | $0.50 - $2.15 /SY | $ 0.75 - $2.60 /SY | $1.25 - $3/SY |
| **High Quantity Cost** | $0.33 to $0.66/SY | | $0.50 - $2.15 /SY | $ 0.75 - $2.60 /SY | $1.25 - $3/SY |
| **Items Included** | See Description | See Definition | Unknown | See Definition | See Definition |
| **Items Excluded** | Marking Removal | Marking Removal | Unknown | Marking Removal | Marking Removal |
| **Typical Service Life** | 3-4 years | 5-7 years | 2-6 years | 3-6 years | 4-10 years |
| **MOT Considerations / Cure time** | Controlled traffic may be permitted as soon as the final layer is applied and rolled, and sufficiently cooled to withstand traffic without damage. A recommended maximum speed of 30 km/h, (20 mph), should be maintained for a period of two (2) hours. | Cure time generally varies from 1 to 4 hours before sweeping to dislodge loose aggregate | Controlled traffic may be permitted as soon as the final layer is applied and rolled, and sufficiently cooled to withstand traffic without damage. | Cure time depends on emulsion properties, generally a few hours. Two hours as per MD Standard Specifications | Cure time depends on emulsion properties, generally a few hours. One hour as per MD Standard Specifications |

| Table B.4 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS D-1, E-1 THROUGH E-3 | | | |
|---|---|---|---|---|---|
| | | **D-1. Ultrathin Bonded Wearing Course (Asphalt)** | **E-1. HMA Overlay - Open Graded Friction Course (OGFC)** | **E-2. HMA Overlay - Ultrathin (<1.5")** | **E-3. HMA Overlay - Ultrathin (<1.5") (High Performance Thin Overlay)** |
| **Treatment Advantages** | | 1. A very good bond due to the heavy tack coat.<br>2. Can be used on projects where there are grade restrictions<br>3. Eliminates the need for utility adjustment.<br>4. Minimal traffic disruption, requires a single lane closure.<br>5. Noise Reduction.<br>6. Increases driver visibility due to reduction in splash/spray.<br>7. Less Fumes | 1. Reduces splash and spray<br>2. Increases skid resistance<br>3. Reduce tire noise | 1. Improves friction, ride, minor rutting, minor surface defects, bleeding and reduces raveling.<br>2. Slows / reduces cracking and moisture damage.<br>3. Performs well in all climatic conditions.<br>4. No traffic restrictions. | 1. Longer lasting than typical ultrathin asphalt mixes.<br>2. Higher asphalt content results in better crack resistance.<br>3. More appropriate for projects with joint reflective cracking. |
| **Treatment Disadvantages** | | 1. Costly<br>2. Handwork is necessary sometimes.<br>3. Must be placed at temperatures above 50 deg F | 1. Need a wedge/level or grade adjustments before placement of OGFC.<br>2. Cannot be used on unstable pavements, which includes pavements with substantial cracking, bleeding, rutting, depressions.<br>3. Do not use in snow or icy areas where tire chains, studded tires or snow plows will affect the aggregate and binder which will result in stripping of the aggregate, contribute to raveling and pavement deterioration.<br>4. Fails Rapidly once failure is eminent.<br>5. Should not be used in areas where there is severe turning movements.<br>6. Should not be placed adjacent to curb and gutter because of the bath tub effect<br>7. Do not use in muddy areas<br>8. Should NOT be used in fuel or oil spill areas.<br>9. Resulting surface drainage impacts must be considered | 1. Negatively affects stripping<br>2. Does not correct structural distresses.<br>3. Needs to be compacted more rapidly than a conventional HMA mix. | 1. Higher Asphalt Content results in higher costs. |
| **Cost Clarification** | **Small Quantity Cost**<br>**Medium Quantity Cost**<br>**High Quantity Cost** | $9 - $14 / SY | $20 / SY | $1.25 to $2.90 per square yard | Anticipated to be similar to Gap-Graded SMA prices. |
| | **Items Included** | Cost is for one-pass only. | See Definition | See Definition | Unknown |
| | **Items Excluded** | Multiple Passes | Marking Removal | Marking Removal | Marking Removal |
| **Typical Service Life** | | 6-12 years | 4-6 years | 5-10 years | 50% longer than Dense Graded Ultrathin Overlays |

| Table B.5 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS E-4 THROUGH E-7 | | | |
|---|---|---|---|---|---|
| | | **E-4. Grind and HMA Overlay - 64-22/28, w/ or w/o 8PV** | **E-5. Hot In-Place Recycling (HIR)** | **E-6. Grind and HMA Overlay, GAP-SMA** | **E-7. Grind and HMA Overlay - 76-22, Dense 8PV** |
| **Treatment Advantages** | | 1. Removes surface distresses<br>2. Facilitates better bonding of the new overlay with the existing overlay.<br>3. Improves friction.<br>4. PCI (post-grinding) can be significantly higher.<br>5. Restores functional and structural service lives.<br>6. No specialized skill necessary. | 1. Can be done on-site<br>2. Reduced Material Costs<br>3. Less Waste | 1. Removes surface distresses<br>2. Facilitates better bonding of the new overlay with the existing overlay.<br>3. Improves friction.<br>4. PCI (Post-Grinding) can be significantly higher.<br>5. Restores functional and structural service lives.<br>6. Relatively no specialized skill necessary.<br>7. Rut-resistant mix and more durable, potentially longer lasting.<br>8. Reduction in the joint reflective cracking, and fatigue cracking compared to other overlay types.<br>9. Limits overspray (wet weather accidents) | 1. Removes surface distresses<br>2. Facilitates better bonding of the new overlay with the existing overlay.<br>3. Improves friction.<br>4. PCI (Post-Grinding) can be significantly higher.<br>5. Restores functional and structural service lives.<br>6. No specialized skill necessary.<br>7. Restores friction |
| **Treatment Disadvantages** | | 1. Reduced Structural Capacity reduces design life, overlay needs to be placed ASAP.<br>2. Rough Ride and loose debris if open to traffic, overlay needs to be placed ASAP.<br>3. Costlier compared to just overlay or wedge/level<br>4. Potential for debonding / separation with the existing surface.<br>5. May be more expensive than a preventive or a reactive maintenance technique.<br>6. If not polymer modified, there is potential for raveling/weathering. | 1. Not recommended for heavily oxidized material<br>2. Requires good surface materials<br>3. Limited to 3" in depth<br>4. Requires Specialized Equipment | 1. Reduced structural capacity reduces design life, overlay needs to be placed ASAP.<br>2. Rough ride and loose debris if open to traffic, overlay needs to be placed ASAP.<br>3. Costlier compared to just overlay or wedge/level<br>4. Relatively more expensive compared to other overlay types.<br>5. Requires plant rearrangement to produce mix. | 1. Reduced structural capacity reduces design life, overlay needs to be placed ASAP.<br>2. Rough ride and loose debris if open to traffic, overlay needs to be placed ASAP.<br>3. Costlier compared to just overlay or wedge/level<br>4. Potential for debonding / separation with the existing surface.<br>5. May be more expensive than a preventive or a reactive maintenance technique. |
| **Cost Clarification** | **Small Quantity Cost** | Cost of Grinding: $5.7 / S.Y<br>Cost of Overlay: <1000 tons: $125 | $.75/SY - $3.25/SY.<br>Cost depends on whether the material is re-mixed, re-paved, or heater scarified. | Cost of Grinding: $5.7 / SY<br>Cost of Overlay: <15,000 tons: $106.50 | Cost of Grinding: $5.7 / SY<br>Cost of Overlay: <1000 tons: $125 |
| | **Medium Quantity Cost** | Cost of Grinding: $2.4 / SY<br>Cost of Overlay: >1000 and <5000 tons: $75 | | Cost of Grinding: $2.4 / SY<br>Cost of Overlay: >15000 and <25000 tons: $82.10 | Cost of Grinding: $2.4 / SY<br>Cost of Overlay: >1000 and <5000 tons: $83.90 |
| | **High Quantity Cost** | Cost of Grinding: $1.5 / SY<br>Cost of Overlay: >5000 tons: $68 | | Cost of Grinding: $1.5 / SY<br>Cost of Overlay: >25000 tons: $82.10 | Cost of Grinding: $1.5 / SY<br>Cost of Overlay: >5000 tons: $68.90 |
| | **Items Included** | Material costs, including hauling and equipment | See Definition | Material costs, including hauling and equipment | Material costs, including hauling and equipment |
| | **Items Excluded** | Unknown | Unknown | Unknown | Unknown |
| **Typical Service Life** | | 8-15 years | 4-15 years | 8-15 years | 8-15 years |

| Table B.6 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS E-8 THROUGH E-11 | | | |
|---|---|---|---|---|---|
| | | **E-8. HMA Overlay - 64-22/28, w/ or w/o 8PV** | **E-9. HMA Overlay, GAP-SMA** | **E-10. HMA Overlay, 76-22, Dense 8PV** | **E-11. Wedge/Level and HMA Overlay - 64-22/28, w/ or w/o 8PV** |
| **Treatment Advantages** | | 1. Restores functional and structural service lives.<br>2. No specialized skill necessary. | 1. Restores functional and structural service lives.<br>2. No specialized skill necessary.<br>3. Rut-resistant mix and more durable, potentially longer lasting.<br>4. Reduction in the joint reflective cracking, and fatigue cracking compared to other overlay types.<br>5. Limits overspray (wet weather accidents) | 1. Restores functional and structural service lives.<br>2. No specialized skill necessary<br>3. Restores friction | 1. Alternative to grinding, while providing minor structural improvements.<br>2. Provides a smooth pre-overlay surface.<br>3. Restores functional and structural service lives.<br>4. No specialized skill necessary. |
| **Treatment Disadvantages** | | 1. Potential for debonding / separation with the existing surface.<br>2. May be more expensive than a preventive or a reactive maintenance technique.<br>3. If not polymer modified, there is potential for raveling/weathering. | 1. Relatively more expensive compared to other overlay types.<br>2. Requires plant rearrangement to produce mix. | 1. Potential for debonding / separation with the existing surface.<br>2. May be more expensive than a preventive or a reactive maintenance technique. | 1. May increase profile grade.<br>2. Potential for debonding / separation with the existing surface.<br>3. May be more expensive than a preventive or a reactive maintenance technique.<br>4. If not polymer modified, there is potential for raveling/weathering. |
| **Cost Clarification** | **Small Quantity Cost** | Cost of Overlay: <1000 tons: $125 | Cost of Overlay: <15,000 tons: $106.50 | Cost of Overlay: <1000 tons: $125 | Cost of Wedge/Level: $110 / ton<br>Cost of Overlay: <1000 tons: $125 |
| | **Medium Quantity Cost** | Cost of Overlay: >1000 and <5000 tons: $75 | Cost of Overlay: >15000 and <25000 tons: $82.10 | Cost of Overlay: >1000 and <5000 tons: $83.90 | Cost of Wedge/Level: $75 / ton<br>Cost of Overlay: >1000 and <5000 tons: $75 |
| | **High Quantity Cost** | Cost of Overlay: >5000 tons: $68 | Cost of Overlay: >25000 tons: $82.10 | Cost of Overlay: >5000 tons: $68.90 | Cost of Wedge/Level: $60 / ton<br>Cost of Overlay: >5000 tons: $68 |
| | **Items Included** | Material costs, including hauling and equipment | Material costs, including hauling and equipment | Material costs, including hauling and equipment | Material costs, including hauling and equipment |
| | **Items Excluded** | Unknown | Unknown | Unknown | Unknown |
| **Typical Service Life** | | 8-15 years | 8-15 years | 8-15 years | 8-15 years |

| Table B.7 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS E-12 THROUGH E-15 | | | | |
|---|---|---|---|---|---|---|
| | | E-12. Wedge/Level and HMA Overlay, GAP-SMA | E-13. Wedge/Level and HMA Overlay - 76-22, Dense 8PV | E-14. PCC Overlay - Unbonded | | E-15. PCC Overlay - Bonded |
| | | | | Asphalt-Surfaced Pavements | Concrete-Surfaced | |
| Treatment Advantages | | 1. Restores functional and structural service lives.<br>2. No specialized skill necessary<br>3. Rut-resistant mix and more durable, potentially longer lasting.<br>4. Reduction in the joint reflective cracking, and fatigue cracking compared to other overlay types.<br>5. Limits overspray (wet weather accidents)<br>6. Alternative to grinding, while providing minor structural improvements.<br>7. Provides a smooth pre-overlay surface. | 1. Restores functional and structural service lives.<br>2. No specialized skill necessary.<br>3. Restores friction<br>4. Alternative to grinding, while providing minor structural improvements.<br>5. Provides a smooth pre-overlay surface. | 1. Reduces urban heat island effect by increasing the pavement surface albedo<br>2. No excavation or removal required.<br>3. Equivalent to a new pavement.<br>4. Improves surface friction, noise and rideability.<br>5. Increases load-carrying capacity | 1. A shorter joint spacing will reduce the curling and warping stresses.<br>2. It is not crucial to match or mismatch overlay joints with the underlying joints.<br>3. No excavation or removal required.<br>4. Equivalent to a new pavement.<br>5. Improves surface friction, noise and rideability. | 1. Addresses surface-related distresses.<br>2. Effective in areas where there are restrictions on vertical clearance, flood zones and grades.<br>3. Increases load-carrying capacity. |
| Treatment Disadvantages | | 1. Relatively more expensive compared to other overlay types.<br>2. Requires plant rearrangement to produce mix.<br>3. May increase profile grade | 1. Potential for debonding / separation with the existing surface.<br>2. May be more expensive than a preventive or a reactive maintenance technique.<br>3. May increase profile grade | 1. Milling of existing asphalt may be required to eliminate surface distortions of 2" or more.<br>2. If less than 6" of asphalt remains after milling, 6" or greater unbonded overlay (or a thinner bonded overlay) should be considered.<br>3. Full-depth repairs should be considered to restore structural integrity in isolated areas<br>4. Has a typically short joint sawing window.<br>5. If the surface temperature of existing asphalt is greater than 120 deg F, surface watering must be performed prior to the placement of overlay, to help reduce the temperature and minimize the chance of early-age cracking.<br>6. May increase profile grade. | 1. Faulting of more than 0.38" in the existing concrete pavement can be a concern.<br>2. Full-depth repairs should be considered to restore structural integrity in isolated areas.<br>3. Has a typically short joint sawing window.<br>4. Concrete patches may require a bond breaker. | 1. Application of curing compound or other curing methods must be timely and thorough, especially at the edges.<br>2. Conventional AASHTO design procedures do not apply.<br>3. Working cracks should be repaired prior to performing this activity.<br>4. Must be applied to pavments in good condition. |
| Cost Clarification | Small Quantity Cost | Cost of Wedge/Level: $110 / ton<br>Cost of Overlay: <15,000 tons: $106.50 | Cost of Wedge/Level: $110 / ton<br>Cost of Overlay: <1000 tons: $125 | Anticipated to be the same as a regular PCC surface (around $67/SY). | | $13 - $16/SY |
| | Medium Quantity Cost | Cost of Wedge/Level: $75 / ton<br>Cost of Overlay: >15000 and <25000 tons: $82.10 | Cost of Wedge/Level: $75 / ton<br>Cost of Overlay: >1000 and <5000 tons: $83.90 | | | |
| | High Quantity Cost | Cost of Wedge/Level: $60 / ton<br>Cost of Overlay: >25000 tons: $82.10 | Cost of Wedge/Level: $60 / ton<br>Cost of Overlay: >5000 tons: $68.90 | | | |
| | Items Included | Material costs, including hauling and equipment | Material costs, including hauling and equipment | Unknown | | See Definition |
| | Items Excluded | Unknown | Unknown | MOT | | Unknown |
| Typical Service Life | | 8-15 years | 8-15 years | 15-30+ years | | 15-30+ years |

| Table B.8 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS F-1 THROUGH F-4 | | | |
|---|---|---|---|---|---|
| | | **F-1. HMA Partial-Depth Patch** | **F-2. HMA Full-Depth Patch** | **F-3. PCC Partial-Depth Patch (Spall Repair)** | **F-4. PCC Full-Depth Patch** |
| **Treatment Advantages** | | 1. Common knowledge.<br>2. No specialized equipment or contractors are required.<br>3. Readily available. | 1. Common knowledge.<br>2. No specialized equipment or contractors are required.<br>3. Readily available. | 1. Longer service life compared to asphalt patch<br>2. Corrects joint spalling and surface distresses | 1. Longer service life compared to asphalt patch<br>2. Effective in correcting all slab distresses. |
| **Treatment Disadvantages** | | 1. MOT can be an issue. | 1. MOT can be an issue. | 1. Expensive<br>2. Curing time required<br>3. Service life likely to be less than the original pavement<br>4. MOT can be an issue. | 1. Expensive<br>2. Curing time required<br>3. MOT can be an issue. |
| **Cost Clarification** | **Small Quantity Cost** | <500 SY: $112<br><500 tons: $169.50 | <500 SY: $112<br><500 tons: $169.50 | <500 SY: $ 286 | <500 SY: $ 286 |
| | **Medium Quantity Cost** | >500 and <2000 SY: $71<br>>500 and <1500 tons: $150 | >500 and <2000 SY: $71<br>>500 and <1500 tons: $150 | >500 and <1500 SY: $243 | >500 and <1500 SY: $243 |
| | **High Quantity Cost** | >2000 SY: $50<br>>1500 tons: $150 | >2000 SY: $50<br>>1500 tons: $150 | >1500 SY: $243 | >1500 SY: $243 |
| | **Items Included** | Material, Placement and Hauling, Removal of existing material. | Material, Placement and Hauling, Removal of existing materials (HMA and base) | Removal, preparing the repair boundaries, material, curing, finishing, texturizing. | Removal of the existing slab, subgrade and base preparation, preparing the repair boundaries, material, curing, finishing, texturizing. |
| | **Items Excluded** | MOT Costs | MOT Costs | Unknown | May not include Load Transfer Provisions |
| **Typical Service Life** | | 4 years | 4 years | 5-15 years | >10 years |

| Table B.9 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS G-1 THROUGH G-3 | | |
|---|---|---|---|---|
| | | **G-1. Cross-Stitching** | **G-2. Dowel Bar Retrofit** | **G-3. Undersealing / Slab Stabilization** |
| **Treatment Advantages** | | 1. Strengthening and tying longitudinal cracks in slabs to prevent slab migration and to maintain aggregate interlock.<br>2. Mitigating the issue of tiebars being omitted from longitudinal contraction joints (due to construction error)<br>3. Tying roadway lanes or shoulders that are separating or causing maintenance problems.<br>4. Tying centerline longitudinal joints that are starting to fault. | 1. Can be used in all climatic regions<br>2. Relatively low life-cycle cost. | See Definition |
| **Treatment Disadvantages** | | 1. Potentially extreme damage to concrete during drilling. | 1. Labor Intensive<br>2. Usually requires Diamond Grinding for smooth surface. | 1. Overfilling voids may lead to worse problems than leaving them unfilled. Slab lift must be closely monitored to avoid damaging the slabs. |
| **Cost Clarification** | **Small Quantity Cost**<br>**Medium Quantity Cost**<br>**High Quantity Cost** | $11 - $17 / bar | $25 - $35 per dowel. | Cement Fly-Ash Grout Undersealing: $0.90 - $1 / SY<br>Asphalt Undersealing: $0.45 - 0.50 / SY |
| | **Items Included** | Drilling of holes, epoxy grout insertion, bar insertion and final grouting. | Slot creation and material removal, sand blasting and cleaning, caulking the joint crack, dowel bar placement, repair material placement, and may include diamond grinding and joint sealing. | 1. Cost depends on the material used, the extent and size of the voids and the size of the project.<br>2. Drilling Injection holes, injection of material and plugging holes. |
| | **Items Excluded** | Unknown | Unknown | 1. FWD testing to detect voids. |
| **Typical Service Life** | | 10-15 years | 9-10 years (depending on the type of bar being used). However, 7-33 years of pavement life extension have been observed. | Extremely variable performance |

| Table B.10 | SUPPLEMENTAL INFORMATION FOR TREATMENTS H-1 THROUGH H-3 | | | |
|---|---|---|---|---|
| | H-1. Diamond Grinding | | H-2. Surface Carbide Grinding | H-3. Diamond Grooving |
| | Asphalt-Surfaced Pavements | Concrete-Surfaced Pavements | | |
| **Treatment Advantages** | 1. Improves friction | 1. Reduces noise<br>2. Improves friction<br>3. Cost effective<br>4. Eliminates the need for taper which is required with overlay alternatives.<br>5. Removal of the wheel path rutting caused by studded tires / chains.<br>6. Removal of permanent slab warping at joints.<br>7. Improvement of transverse slope to improve surface drainage. | 1. Remove surface distresses<br>2. Facilitates better bonding of the new overlay with the existing overlay.<br>3. This technique can be used independently to improve friction.<br>4. PCI (post-grinding) can be significantly higher. | 1. Provides surface with excellent braking traction, therefore reducing wet weather accidents.<br>2. Transverse grooving more effective than longitudinal grooving because the path the water takes to drain in the transverse direction is shorter. |
| **Treatment Disadvantages** | 1. Increases noise.<br>2. Diamond blades can get clogged during operation. | 1. Not desirable to use on softer aggregate<br>2. Faulting of the pavement joints will mostly reoccur if the load transfer is deficient.<br>3. Reduces pavement thickness which could affect fatigue performance.<br>4. Not recommended for pavement thickness less than 9", because of insufficient structural capacity to support heavy vehicle loadings.<br>5. Not to be used for "D" cracking, reactive aggregate, freeze-thaw damage. | 1. Reduced structural capacity reduces design life, overlay needs to be placed ASAP.<br>2. Rough ride and loose debris if open to traffic, overlay needs to be placed ASAP.<br>3. Costlier compared to just overlay or wedge/level | 1. Limitation of Longitudinal grooving is the "WIGGLE" (small lateral movement) that small vehicles and motorcycles may encounter. This may be mitigated by limiting the groove spacing to 3/4" and using 0.125" wide grooves. |
| **Cost Clarification** – **Small Quantity Cost** | $1.70 - $6.70 / SY | $1.70 - $6.70 / SY | $5.7 / SY | $1.25 - $3 / SY in 1998 |
| **Medium Quantity Cost** | | | $2.4 / SY | |
| **High Quantity Cost** | | | $1.5 / SY | |
| **Items Included** | Unknown | Unknown | See Definition | Unknown |
| **Items Excluded** | Unknown | Unknown | See Definition | Unknown |
| **Typical Service Life** | 2-5 years | 8-15 years | N/A | Information on performance is not readily available ; however, treatment lives are expected to be greater than the 8-15 years noted for diamond grinding. |

| Table B.11 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS I-1 THROUGH I-5 | | | | |
|---|---|---|---|---|---|---|
| | | **I-1. Cold-in-Place HMA Recycling using Emulsified Asphalt** | **I-2. Cold In-Place HMA Recycling using Foamed Asphalt** | **I-3. Deep Grind and Thick Overlay** | **I-4. Break/Crack & Seat and HMA Overlay** | **I-5. Rubblization and HMA Overlay** |
| **Treatment Advantages** | | 1. Can be done on-site<br>2. Reduced material costs<br>3. Less waste<br>4. Excavation and placement concurrent<br>5. "Green" - less energy (ambient placement)<br>6. "Green" - uses all recycled material | 1. Can be done on-site<br>2. Reduced material costs<br>3. Less waste<br>4. Excavation and placement concurrent<br>5. "Green" - less energy (ambient placement)<br>6. "Green" - uses all recycled material<br>7. No "Cure" time. | 1. Subgrade is not disturbed, resulting in no E&S or other SWM requirements.<br>2. Allows for a lower profile grade when required, while maintaining adequate pavement structure.<br>3. Cheaper than reconstruction. | 1. Significant (12-15 years) achieved.<br>2. Limits the potential for reflective cracking while maintaining the majority of the structural capacity of the rigid pavement. | 1. No excavation Cost<br>2. Recycling the existing PCC.<br>3. Cost Effective Alternative.<br>4. Reduces potential for Joint Reflective Cracking. |
| **Treatment Disadvantages** | | 1. Requires specialized equipment<br>2. Lengthy cure time during construction - MOT problem<br>3. Requires resurfacing | 1. Requires specialized equipment<br>2. Requires resurfacing | 1. Less aggregate base available for drainage.<br>2. Existing "Top of Subgrade" elevation can be difficult to define if variable subbase and bound pavement thicknesses exist. | 1. Removal of any pre-existing AC overlay is required.<br>2. May result in grade increase. | 1. Results in grade increase<br>2. Environmental Issues (Dust and Noise)<br>3. A minimum subgrade strength of 7,500 psi is required.<br>4. Need to perform subgrade strength tests like GPR. |
| **Cost Clarification** | **Small Quantity Cost** | $4 / SY | $4 / SY | Use current prices for 10" of Class I excavation and 6" of HMA or PCC resurfacing. | No information | $ 4.50 per SY (2001) (See MD 404 CO323) |
| | **Medium Quantity Cost** | In-Between | In-Between | | | |
| | **High Quantity Cost** | $1.7 / SY | $1.7 / SY | | | |
| | **Items Included** | See Definition | See Description | Materials and Construciton | Break and Seat | PCC Rubbilization including HMA removal prior to rubblization |
| | **Items Excluded** | HMA Surface | HMA Surface | MOT, Markings, Barriers | HMA Overlay | See Definition |
| **Typical Service Life** | | 15-25 years | 15-25 years | 8 Years | 15-25 years | 15-25 years |

| Table B.12 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS J-1 THROUGH J-3 | | |
|---|---|---|---|---|
| | | **J-1. Reconstruction using Cement Stabilized Aggregate Base** | **J-2. Reconstruction using Emulsified Asphalt Base** | **J-3. Reconstruction using GAB and HMA** |
| **Treatment Advantages** | | 1. Reduction in cost.<br>2. Increase strength in aggregate base layer. | 1. Energy Savings. Emulsified asphalt does not require a petroleum solvent to make it liquid. (However, some medium-setting grades contain limited amounts of solvent to enhance mixing qualities.) Asphalt emulsions can also be used in most cases without additional heat.<br>2. The ability of certain types of asphalt emulsions to coat damp aggregate surfaces. This reduces the fuel requirements for heat for drying aggregates.<br>3. Availability of a variety of emulsion types. New formulations and improved laboratory procedures have been developed to satisfy design and construction requirements. Polymer modification has allowed the use of emulsions for techniques not previously considered, such as Ralumac® micro-surfacing NovaChip® ultrathin bonded wearing course, RoadArmor® High Performance Chip Seal, EncoreTM emulsion hot in-place recycling and chip seals on high traffic volume highways.<br>4. The ability to use cold materials at remote sites.<br>5. The ability to handle asphalt emulsions at lower temperatures, and the lower flammability of water based materials.<br>6. The ability to increase the service life of slightly distressed existing pavements. Preventative maintenance is a more cost-effective use of highway dollars.<br>7. The ability to recycle. Asphalt emulsions are being used extensively in a variety of recycling systems. They are particularly suited to in-place recycling. Pavements constructed with asphalt emulsions will also be able to be recycled in the future | 1. Widely accepted. |
| **Treatment Disadvantages** | | 1. Additional testing to ensure strength adequacy.<br>2. Reflective cracking Potential<br>3. Special mixing equipment needed | 1. Cure time during construction adds to MOT. | 1. High material costs |
| **Cost Clarification** | **Small Quantity Cost** | \$6 / SY | No information | HMA Surface(\$70/ton), HMA Base (\$60/ton), GAB (\$9.3/ton) |
| | **Medium Quantity Cost** | | | HMA Surface(\$43/ton), HMA Base (\$45/ton), GAB (\$7/ton) |
| | **High Quantity Cost** | | | HMA Surface(\$39/ton), HMA Base (\$38/ton), GAB (\$5.8/ton) |
| | **Items Included** | Compacted aggregate and cement | Unknown | HMA Surface, HMA Base, GAB |
| | **Items Excluded** | HMA overlay | Unknown | Excavation, MOT, Tack Coat, etc |
| **Typical Service Life** | | 15-25 years | 15-25 years | 15-25 years |

| Table B.13 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS J-4 THROUGH J-7 | | | |
|---|---|---|---|---|---|
| | | **J-4. Reconstruction using Lime Stabilized Subgrade** | **J-5. Reconstruction using PCC** | **J-6. Reconstruction using Pre-Cast PCC Slabs** | **J-7. Reconstruction using Soil Cement Base Course** |
| **Treatment Advantages** | | 1. Ideal where base has structurally failed and / or granular base is no more than 6 inches.<br>2. Lower cost<br>3. Achieve greater strength and durability than alternate products.<br>4. Achieve optimum moisture and strength of subbase and subgrade, even under very wet conditions or high clay content.<br>5. Better workability than cement. | 1. Significant structural improvement achieved.<br>2. Reduces potential to rut.<br>3. Relatively lower maintenance requirements.<br>4. Our most durable pavement option<br>5. Longer design life | 1. Significant structural improvement achieved.<br>2. Reduces potential to rut.<br>3. Relatively lower maintenance requirements.<br>4. Very fast PCC construction<br>5. Eliminates curing time.<br>6. Slabs have been tested for strength requirements.<br>7. Facilitates short MOT in congested areas. | 1. Increase strength of in-situ soil.<br>2. Reduces cost, because of less excavation and less paving material required. |
| **Treatment Disadvantages** | | 1. Does not work with all soil types.<br>2. Requires special equipment and expertise.<br>3. Additional testing required to ensure structural adequacy.<br>4. Need clay for reaction. | 1. Noise<br>2. Expensive future rehab<br>3. MOT | 1. Expensive<br>2. Limited contractors<br>3. More precise elevation checks when excavating<br>4. Time required for proper installation | 1. Potential for reflective cracking<br>2. Additional testing required to ensure strength adequacy.<br>3. No reaction with fly ash and aluminium |
| **Cost Clarification** | **Small Quantity Cost**<br>**Medium Quantity Cost**<br>**High Quantity Cost** | $12 / SY (12" Depth) | $70 / SY | $54 / SF (9" Depth) | $18/ S.Y (12" Depth) |
| | **Items Included** | Unknown | Unknown | Unknown | Unknown |
| | **Items Excluded** | Unknown | Unknown | Unknown | Unknown |
| **Typical Service Life** | | 15-25 years | 25 years | 25 years | 15-25 years |

| Table B.14 | | SUPPLEMENTAL INFORMATION FOR TREATMENTS J-8 THROUGH J-11 | | | |
|---|---|---|---|---|---|
| | | **J-8. Reconstruction using Roller Compacted Concrete** | **J-9. Reconstruction using Foamed Asphalt Base** | **J-10. Reconstruction using Lime-Stabilized Base Course** | **J-11. Full-Depth Reclamation (FDR)** |
| **Treatment Advantages** | | 1. Typically constructed without joints.<br>2. Does not require forms or finishing, nor dowels or steel reinforcing, therefore less construction duration and reduces costs, minimizes labor. | Material can be mixed and placed on site | 1. Ideal where base has structurally failed and / or granular base is no more than 6 inches.<br>2. Lower cost<br>3. Achieve greater strength and durability than alternate products.<br>4. Achieve optimum moisture and strength of subbase and subgrade, even under very wet conditions or high clay content.<br>5. Better Workability than Cement. | 1. Conservation of non-renewable resources<br>2. Energy conservation compared to other reconstruction methods<br>3. Few pieces of equipment are required<br>4. Elimination of bumps, dips, rutting, potholes, patches and cracks<br>5. Subgrade deficiencies can be corrected by stablization. |
| **Treatment Disadvantages** | | 1. The main concern is drying. The surface must be kept moist for atleast 7 days or until the curing compound is applied. If allowed to dry too fast:<br>a. Concrete will experience drying shrinkage, which will lead to cracking.<br>b. Cement will not continue to hydrate, which will result in lower strengths and less durability.<br>c. Dusting of the surface will be more prevalent.<br>2. Rough ride | Requires special equipment and expertise | 1. Does not work with all soil types.<br>2. Requires Special Equipment and expertise.<br>3. Additional testing required to ensure structural adequacy.<br>4. Need Clay for Reaction. | 1. Project may result in variable conditions if existing HMA and Base thickness vary significantly.<br>2. MOT will be required for both stabilization and overlay. MOT is significantly higher if emulsion is used as a stabilization agent (1-2 weeks), and upto 1-2 days if foamed asphalt is used as a stabilization agent. |
| **Cost Clarification** | **Small Quantity Cost** | $115 / CY | No information | No information | $3.50 to 4.50 per SY |
| | **Medium Quantity Cost** | | | | |
| | **High Quantity Cost** | | | | |
| | **Items Included** | Unknown | Unknown | Unknown | Excavation and mixing, placement of all materials |
| | **Items Excluded** | Unknown | Unknown | Unknown | MOT, Markings and Resurfacing |
| **Typical Service Life** | | 25 years | 15-25 years | 15-25 years | 12 years |

# Appendix C – List of Acronyms

| | | | |
|---|---|---|---|
| ASR | Alkali Silica Reactivity | HMA | Hot-Mix Asphalt |
| ADT | Average Daily Traffic | IRI | International Roughness Index |
| CSAB | Cement Stabilized Aggregate Base | JPCP | Jointed Plain Concrete Pavement |
| CIR | Cold In-Place Recycling | JRCP | Jointed Reinforced Concrete Pavement |
| CRCP | Continuously Reinforced Concrete Pavement | LKD | Lime Kiln Dust |
| CI | Cracking Index | MOT | Maintenance of Traffic |
| DOT | Department of Transportation | MDSHA | Maryland State Highway Administration |
| FWD | Falling Weight Deflectometer | OMT | Office of Materials Technology |
| FDR | Full-Depth Reclamation | OGFC | Open Graded Friction Course |
| GAP - SMA | Gap Graded Stone Matrix Asphalt | PAGD | Pavement and Geotechnical Division |
| GAB | Graded Aggregate Base | PM Base | Pavement Management Database |
| GPR | Ground Penetrating Radar | PCC | Portland Cement Concrete |
| HPV (8PV) | High Polish Value | RCC | Roller Compacted Concrete |
| HLR | Highway Location Reference | W/L | Wedge and Level |
| HIR | Hot In-Place Recycling | | |

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